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FORSKNINGSCENTRET FOR SKOV & LANDSKAB

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1. ENGLISH ABSTRACT

JENSEN, FRANK SØNDERGAARD (1999): Forest recreation in Denmark from the 1970s to the 1990s. - The Research Series, Vol. 26. Danish Forest and Landscape Research Institute, Hørsholm. 166 pp.

Over the last couple of decades, outdoor (forest) recreation has received more and more political and administrative attention. This has increased the demand for valid information on the recreational use of the forests and the preferences of the population. The dissertation begins with a brief introductory overview of the history of recreation, leisure time, legislation and policy in the area. The present project endeavours to fulfil four aims. (1) Regarding the preferences of the population, one could say "Why not just ask the "experts" (managers, planners and the like) about their perception of the forest preferences of the general public?" Although it is concluded that there are more similarities than differences between the perceptions of the experts and the preferences of the population, there are misperceptions in connection with about one third of the issues under investigation. This indicates that there is a basis for investigating the public's own views on the development of the forests. (2) A need for knowledge, however, is not tantamount to a need for new surveys - are there no other surveys whose results can be used? This question is investigated by comparing forest recreation research in the Nordic countries. Similarities as well as differences are found. Norway, Sweden and Finland, in general, have most in common in forest recreation, while Denmark forms a link between the Continent and Scandinavia. The conclusion is that research results cannot simply be transferred to Denmark from the other Nordic countries. Finally, what about previous research in Denmark? It is now twenty years since the first data for the only national surveys so far of the population's use of and wishes for the forests were gathered, so one can ask the legitimate question: "Are the results of these surveys still valid?" By reformulating this single question into two, the last two aims of the project are fulfilled by answering: (3) How has the use of the forest for recreational purposes by the general public changed from the 1970s until the 1990s? and (4) Are the forest environment preferences of the general public the same today as they were a couple of decades ago? - Based on representative questionnaire-surveys of the adult Danish population it is concluded that there have only been minor changes in the Danish population's recreational use of the forests and their preferences in this respect.

KEY WORDS: FOREST RECREATION, VISITOR USE, FOREST PREFERENCES, EXPERTS' PERCEPTION, GENERAL PUBLIC, QUESTIONNAIRE, TRENDS, SCANDINAVIA, DENMARK.

2. DANISH ABSTRACT

JENSEN, FRANK SØNDERGAARD (1999): Forest recreation in Denmark from the 1970s to the 1990s. - The Research Series, Vol. 26. Danish Forest and Landscape Research Institute, Hørsholm. 166 pp.

Fra politisk og administrativ side lægges der stadig større vægt på skovenes betydning for befolkningens friluftsliv. Denne udvikling øger behovet for viden om befolkningens anvendelse af skovene til friluftsliv samt ønskerne til udformningen af skovene. Som introduktion gives der et kortfattet overblik over den historiske udvikling af fritiden, friluftslivet samt lovgivning og politik i relation hertil. Afhandlingen søger at afklare fire spørgsmål: 1) Er det nødvendigt at undersøge befolkningens præferencer for forskellige skovmiljøer; kan man ikke blot spørge "eksperterne" (skovforvaltere, undervisere, politikere m.fl.) om hvad de tror befolkningen foretrækker? - Skønt de gennemførte undersøgelser viser flere ligheder end forskelle mellem eksperternes formodninger og befolkningens præferencer, findes der dog divergerende opfattelser i forbindelse med ca. en tredjedel af de undersøgte emner; hvilket indikerer et behov for undersøgelser af befolkningens præferencer. 2) Et behov for viden er dog ikke ensbetydende med et behov for nye undersøgelser. Findes der ikke eksisterende undersøgelser der kan benyttes? Spørgsmålet er undersøgt ved at sammenholde friluftsliv-undersøgelser fra Skandinavien. - Såvel ligheder som forskelle er fundet. Friluftslivet i Norge, Sverige og Finland har generelt mest til fælles, mens Danmark fremstår som et bindeled mellem det sparsomt befolkede Skandinavien og det mere tætbefolkede Europa. Det konkluderes, at undersøgelses-resultater ikke umiddelbart kan overføres fra det øvrige Norden til Danmark. - Findes der så ikke allerede eksisterende danske undersøgelser, hvis resultater kan anvendes? Det er ca. 20 år siden, at data til de hidtil eneste landsdækkende danske undersøgelser af befolkningens friluftsliv i skovene og befolkningens præferencer for disses udformning blev indsamlet. Man kan derfor stille det berettigede spørgsmål: Står disse resultater stadig ved magt? - Besvarelsen af dette spørgsmål opfylder afhandlingens sidste to mål: 3) Er der sket ændringer i befolkningens anvendelse af skovene gennem de seneste to årtier? samt 4) Har præferencerne for forskellige skovmiljøer ændret sig? - På baggrund af en repræsentativ spørgeskema-undersøgelse, blandt ca. 3000 voksne danskere i alderen ca. 15-77 år, er disse to sidste spørgsmål søgt afklaret. Det konkluderes overordnet, at der kun er sket mindre forandringer i befolkningens anvendelse af skovene til friluftsliv, og de ønsker man har til disses udformning.

KEY WORDS: FRILUFTSLIV, SKOVBESØG, ANVENDELSES-UNDERSØGELSE, PRÆFERENCE-UNDERSØGELSE, SPØRGESKEMA-UNDERSØGELSE, EKSPERTVURDERING, TENDENS, SKANDINAVIEN, DANMARK.

3. PREFACE

This PhD dissertation was written at the Unit of Landscape, Department of Economics and Natural Resources, The Royal Veterinary and Agricultural University, Copenhagen, with Professor *Jørgen Primdahl* as supervisor.

The ancillary subject (statistics) was studied at the Department of Mathematics and Physics of The Royal Veterinary and Agricultural University, with Professor *Mats Rudemo* as supervisor.

Members of the public as well as a scientific evaluation panel attended the defence of the dissertation which was held on 19th June 1998. The panel included: Dr. *Bjørn P. Kaltenborn*, Eastern Norway Research Institute, Lillehammer, Norway; Professor *Finn Helles*, Unit of Forestry, Department of Economics and Natural Resources The Royal Veterinary and Agricultural University, and Professor *Jørgen Primdahl*, Unit of Landscape, Department of Economics and Natural Resources, The Royal Veterinary and Agricultural University.

Financial support was received from the *Danish Research Academy,* the *National Forest and Nature Agency* and the *Danish Forest and Landscape Research Institute* (formerly the *Danish Forest Experiment Station*).

4. LIST OF PAPERS

The dissertation is based on the following papers, henceforth referred to by Roman numerals:

I Jensen, Frank Søndergaard 1993: Landscape managers' and politicians' perception of the forest and landscape preferences of the population. - For. & Landsc. Res. 1: 79-93.

II Jensen, Frank Søndergaard 1995: Forest recreation. - *In*: Multiple-use forestry in the Nordic countries. Hytönen, M. (ed.). - The Finnish Forest Research Institute, Helsinki, pp. 245-278.

III Jensen, Frank Søndergaard 1997a: Forest recreation in Denmark from 1976 to 1994. - Manuscript.

IV Jensen, Frank Søndergaard 1997b: Changes in the forest preferences of the Danish population from 1977 to 1994. - Manuscript.

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5. CONTENTS

5. CONTENTS (CONTINUED)

PAPERS I-IV

6. INTRODUCTION

DEFINITIONS

In the report on *Denmark's Nature and Environment Policy 1995* by the Ministry of Environment and Energy (Miljø- og Energiministeriet 1995a, p. 301) the Danish term "friluftsliv" ('outdoor life') is defined as follows (translated from Danish): 'The designation outdoor life is used to cover numerous human activities which take place outside the home, the place of work and the sports ground, and which are chosen by inclination'.

Douglass (1975, p. 6) defines *recreation* as "Any action that refreshes the mental attitude of an individual is recreation" and *outdoor recreation* as "the wholesome recreation that is done without the confines of a building". As Lindhagen (1996) states, refreshment of mental attitude - and wholesomeness - are relatively hard to measure. I define forest recreation more pragmatically in the present dissertation: *All activities in a forested area during leisure time are considered as forest recreation.* (Thus the forest environment is used as the physical demarcation for the project).

Definitions of leisure and recreation are many. The situation is described for example by Driver et al. (1991, p. 7): "We are thus left with varied definitions and orientations. We do not see this as a serious problem because of the rather commonly held intuitions and understandings of what leisure and recreation are which seem to differ more in nuance than substance and which seem to serve rather specific purposes for different people." (For further examples of definitions, see for example Schwarz et al. (1976)).

6.1 Background

HISTORY OF THE NON-MATERIAL VALUES OF THE FOREST (RECREATION)

On the basis of the extensive work *Kulturskoven. Dansk skovbrug fra oldtid til nutid* by Fritzbøger (1994), a brief overview of the historical development of the non-material values associated with the forest (in the present context synonymous with its recreational value) is given:

The traditional products of the forest usually have something to do with food or material resources. Throughout most of history, though, people have also benefited from the more intangible (e.g. spiritual and symbolic) values of the forest. On the sixth day of Creation God made Man the Lord of Creation, and from the dawn of time western civilization has regarded nature as something to be *used.* Most of the population lived in the countryside and lived by breeding animals and growing plants; and their greatest concern was the stores for the winter and the survival of their children. So no evidence has survived, from Denmark or other parts of Europe, that the so-called intangible/non-material values of nature were any concern of the general population. In the last years of the eighteenth century, however, great changes took place. Prosperity increased, edu-

cation spread, and an ever-larger section of the population was left outside agrarian society and viewed nature from a distance in the cities. In other words, there was for the first time in history both the opportunity and the need to formulate the shared experience and conditions of mankind in written words and pictures. And in this interpretation nature and history became the two unifying concepts.

The cultural currents that posterity has called Romanticism first arrived in Denmark in earnest from Germany around the year 1800. As a reaction against the cult of Reason in the Enlightenment, Romanticism sought the original, spiritual values of life which only the highly aware loner could approach through nature and history. And it was precisely the historical novel and landscape painting that became the expressive idioms that gained most currency throughout the century, even among the wider population (see Seedorff 1994 for a detailed study of man's perception of the forest as demonstrated in Danish fiction in the period 1750-1950; and e.g. Hansen (1989) for a further discussion of different views on nature).

In the landscape painting of the Danish Golden Age a picture of the forest was formed which we have all learnt to recognize as something typically Danish. The depiction of the forest reached its apogee with *P. C. Skovgaard* and *J. T. Lundbye* in particular; in very different ways they both expressed the image of the forest around the middle of the nineteenth century. In Lundbye's pictures weathered, storm-torn forest trees reflected a poverty-stricken Denmark where human beings waged a daily battle for subsistence. In Skovgaard's work, on the other hand, the bright, light Zealand beech forest was "the temple of nature"; a harmonious park landscape that testified to peace, happiness and wealth.

It was not only the art and literature of the Golden Age that cultivated the forest as an idea and ideal. For centuries the youth of the agrarian society had their dancing and festival grounds in the forest, and throughout the 1800s the *picnic* or trip to the woods developed into a favourite Sunday activity for the citizenry of the towns. The Romantic cult of "wild nature" coincided however with the growth of rational forestry. So as the learned intellectuals of the city culture went in search of "the Spirit of Nature", and the more ordinary public went on Whitsun excursions with their picnic baskets, the woodland nature became less and less "natural". To remedy this discrepancy, many landowners set aside smallish parts of their forest lands as *forest parks*.

We can thus conclude that the "intangible" element of the use of the forests only came into conflict with its tangible counterpart when timber production was rationalized and goal-oriented after 1800. For as the bulk of the rural population who had made part of their living for centuries in the forests were shut out, the growing urban population's wish for contact with nature increased. And when the reform of agriculture was finally completed, there were by and large no other "natural" open spaces left than the ordered forests.

A more detailed review of the history of the recreational aspect of the non-material forest values in Denmark is outside the scope of this work. A

chart in Paper II*) (Jensen 1995, p. 246 based on Kardell 1979) gives an impression of the aspects that have been important to the development of recreational behaviour since the 19th century,

LEISURE TIME (RECREATION)

Leisure time, its status and its use, have been crucial to the formation of the everyday life of the individual. For some people the transition between work and leisure is fluid, since their work gives them the opportunity for personal development, social relations, etc. For others, whose work offers no such opportunities, but who may on the contrary have a job that is full of risks and strains, being off work can be a benefit in itself (Worm 1980, p. 253).

Apart from some hunting activity (mainly by the aristocracy), there was hardly any recreational use of the forest 100-200 years ago. This because hardly anybody had any *leisure time*. In Denmark - as in other industrialized countries - the leisure time available for recreation has increased significantly during the present century. The following summary of the development of leisure time is based on the entries on *arbejdstid* ('working hours') and *ferie* ('holiday/vacation') in the *Danish National Encyclopaedia* (Den Store Danske Encyklopædi 1994, pp. 556f; 1996, pp. 269f), and the chapter on *Leisure* by Bonke (1997, pp. 291-299) in *Living Conditions in Denmark. Compendium of statistics 1997.*

In the former agrarian and craft society working hours were determined partly by the shifting of the seasons and the time of day, and partly by the nature of the tasks. At the beginning of industrialization in the mid-1800s there was a working day in the summer of up to 12-14 hours. From the 1880s on the working day was gradually reduced, and in 1919 the labour movement was finally granted its demand for an eight-hour day (and a 48-hour week). At the end of the 1950s the normal working week arrived at through collective bargaining was 45 hours, and since then it has gradually been reduced to the present 37 hours (cf. Table 1). It should be noted here that for many families with two adults the total weekly working hours - as a result of the increasing numbers of women working outside the home - has probably rather grown from 48 hours at the beginning of the 50s to 60-75 hours in the course of the 80s.

Working hours can also be calculated on an annual basis. In this case the length of holidays is an important factor. The annual holiday was one week in 1930, three weeks in 1955 and since 1981 has been five weeks. Taken as a whole the reductions in the working week and increases in holiday time correspond to a reduction in the annual labour supply since the 1950s of about 25%. The actual working time is also influenced by factors like unemployment, parental leave and other leave schemes.

*) See p. 64.

Table 1
Official working week 1900-1990 (Den Store Danske Encyklopædi 1994, p. 557).

Year	Working week in hours *collective bargaining agreements*
1900	60.4
1903	59.7
1906	59.0
1908	58.5
1912	57.1
1914	56.4
1919	48.0
1958	47.5
1959	45.0
1966	44.0
1968	42.5
1974	40.0
1987	39.0
1988	38.0
1990	37.0

Leisure time is however not simply the time that is left when occupational work is subtracted from the total time. True leisure time is defined in the studies of time use as the time that is at people's free disposal when working time, including transport time, education and training time, and the time spent on other necessary activities and chores such as sleeping, meals, housework and child care have been subtracted from the 24 hours of the day. According to the studies of the population's use of time in the years 1964, 1975 and 1987, there is no indication that the total daily or weekly leisure time has become longer - rather the contrary with a decline from 1964 to 1987 of about half an hour daily. On weekdays the leisure time of an average person was a good six hours, while at weekends it was about 9½ hours i 1987. Leisure time is in addition dependent on age and life cycle. For families with small children, for example, where the parents have jobs, the weekdays will be busier and they will of course have far less leisure time. Over time there have also been changes in the actual use of the free time. For example, between 1964 and 1987 there has been a notable decline in the part of leisure time used for home activities (like relaxation, being with one's children and spouse, reading and listening to the radio and music) - from 55% to 38% on weekdays. These figures for home life do not include television, which accounted for 16% and 22% of leisure time respec-

tively. From 1987 until today, however, there have been many changes in home life. For example the number of available TV channels has more or less exploded - in 1995 an average Danish household could receive twelve TV channels.

In the nineteenth century *holidays* were an unknown concept for workers and were mainly the privilege of the upper classes. Around the year 1900 the northern European bourgeoisie developed a distinctive summer residence culture, where the families, including servants, moved out to summer homes in the countryside or by the sea. The prohibition of Sunday work from 1891 in Denmark, for example, was of great importance to the development of the allotment movement in the environs of the cities. In time the concept of "weekends", which had arisen in Britain, and of short holidays, became more and more widespread, and by 1919 about 20% of unionized workers in Denmark were taking holidays. By 1934 the figure had risen to 47%, although true holidays with pay were not introduced until the Holiday Act of 1938. In 1939 the Act required a holiday of nine days with pay and in 1940 it was twelve days. Leisure time in the inter-war years was also inspired by movements - especially from Britain, Germany and the USA - like the Scouts and rambling and camping movements. In Denmark, for example, real camping life began at the end of the 1920s when the first fixed camping grounds arose at suitable cycling distances from the cities. During the German occupation of Denmark restrictions on petrol and in train and ferry traffic, rationing and the suspension of tourism abroad meant that the cycling and rambling/youth hostel movements spread in earnest. (In the 1940s also the *Outdoor Council* was founded (1942); an umbrella organization with the primary objective to ensure that leisure and outdoor activities can take place with the greatest possible consideration for nature and local environment. The council now includes more than 80 independent member organizations). As cycling and hiking holidays began to gain ground again in the 1980s, a number of alternatives arose to the traditional campsites with high standards and many facilities, i.e. the more than 600 very basic tent and nature camping sites that the Outdoor Council, in cooperation with organizations like the *National Forest and Nature Agency*, has developed with the concept 'Open-Air Accommodation' (Den Store Danske Encyklopædi 1995b, p. 616).

Finally I should mention motoring, which has been a very important factor in the development of post-war leisure transport. In 1950 for example there were about 0.2 million registered vehicles (cars, vans and lorries as well as buses); in the period up until today the development has been: 1960 - c. 0.65 mill.; 1970 - c. 1.3 mill.; 1980 - c. 1.6 mill.; and in 1994 c. 2 mill. vehicles. It can also be noted that in the ten-year period 1981-92 vehicular traffic, measured in kilometres per person, has risen by 70% (Den Store Danske Encyklopædi 1995a, p. 604).

LEGISLATION (RECREATION)

Norway, Sweden, Finland and Iceland have the 'Right of Common Access' ('Everyman's Right'). This is a very old traditional privilege in sparsely populated Scandinavia. It grants the right of common access to private and public land to everyone, but also involves certain obligations (cf. for example Nordiska ministerrådet (1997) for more details of the right of public access to the countryside in the Nordic countries).

In more than one way, Denmark forms the link between sparsely populated Scandinavia and the more densely populated Continental Europe. This is also evidenced by the rules for public access to the countryside. It is believed that the Right of Common Access has also applied in Denmark, as it has in the rest of Scandinavia. Presumably this was the case until a 1781 act forbade access by all unauthorized persons to the national (Royal) forests. Legally - but not in practice - this situation prevailed until the first Nature Conservation Act in 1917 re-established public access to the national forests. The issue of opening the private forests, too, to the public by law, was raised for example in connection with the 1917 Act, but at that time the legislature had to refrain from this intervention in private property rights. A quotation from 1917 provides some insight in to the attitudes of the time: after Professor *Johannes Helms*, in *Dansk Skovforenings Tidsskrift* (a periodical of the interest organization of the private forest-owners) has described the possibility of obtaining financial compensation in connection with possible conservation/protection legislation, he finishes his account of the first Nature Conservation Act as follows: 'The matter becomes more difficult when it comes to the Act's help in obtaining access to the forest for the public. Full compensation can be paid, but what is lost to the forest owner in such a case is not direct economic value, but "privilege" or "amenity" of some kind - for example protected hunting rights, which it is difficult to assess in money terms. However, there are hardly grounds to take the matter very seriously. Hitherto, Danish forest owners have with great liberality granted the public access to and the benefit of their forests, so it is to be hoped that the public will refrain from demanding access, with the aid of the Nature Conservation Act, to the few and small areas that the forest owners have reserved for themselves.' (translated from Helms 1917, p. 442).

Not until 1969 did an amendment to the Nature Conservation Act establish a legal right of access to the private forests (with an area of at least 5 hectares). In the new Nature Protection Act, which came into force in 1992, these rights of access have been extended, and now for example include the use of bicycles in private forests and access to the countryside.

Finally, it should be mentioned that the intent clause of the Forest Act (1989) states: "1.-(2) In administration of the Act importance shall be attached to ensuring that forests are managed in order to increase and improve wood production and to protect landscape amenity, nature conservation, cultural heritage and environmental-protection interests, as well as recreational activity interests. 2.-(1) In publicly-owned forests, landscape amenity, nature conservation, cultural heritage and environmental-protection interests, as well as recreational activity interests, shall be given special emphasis." (National Forest and

Nature Agency 1989). (Minor amendments to the Forest Act passed in 1996; and to the Nature Protection Act in 1997).

POLICY (RECREATION)

As described above, a greater need has arisen in the present century for outdoor activities. The following are some of the most important reasons usually given for the growing need for outdoor experiences (cf. Koch 1975, p. 9):

- Population growth in combination with increasing urbanization.
- The higher standard of living, which along with the increase in leisure time (however cf. p. 12) means increasing consumption of leisure benefits.
- The enhanced mental strains in life conditions.

In the light of the above as well as other factors, the Danish political and administrative system (and obviously its NGOs) are increasingly emphasizing the importance of the forests and other nature areas for outdoor recreation (cf. also the above-mentioned legislation initiatives). One of the first recreation policy initiatives was the publication *Ud i det fri - om fritid og friluftspolitik* ('Out in the open air - leisure and outdoor recreation policy') (Miljøministeriet 1986).

The report *Denmark's Nature and Environment Policy 1995*, published by the Ministry of Environment and Energy (Miljø- og Energiministeriet 1995a, p. 301) states (translated from Danish): 'Socially, there are important benefits in creating a good framework for the outdoor life of the population on weekdays, weekends and holidays. The health, quality of life, experience of nature and environmental awareness of the population are to a great extent associated with its access to the countryside and an active outdoor life'.

With the 1995 publication *Experiencing the State Forests. Outdoor life on the areas of the National Forest and Nature Agency*, the National Forest and Nature Agency for the first time issued an overall description of the management of the state-owned forests in terms of the recreational aspect:

"The activities of outdoor life must be weighted against the consideration for production and nature conservation. Specific choices must be made, depending on the local conditions. However, very weighty arguments would be needed to limit public access to the State forests.

The various activities must be adjusted to each other so no friction occurs.

It is the aim of the National Forest and Nature Agency that the State forests may accommodate most forms of outdoor activities.

When having to choose between alternatives, the National Forest and Nature Agency will have "ordinary people's" ordinary picnic as top-priority.

Un-organised use will be weighted more heavily than organised use.

The use by children and youngsters will have a higher priority than other age groups.

The use by the urban population will have a particularly high priority.

Activities for the disabled, the elderly and young offenders are taken into special consideration.

Deciding the various kinds of outdoor activities implies specific decisions which are made by the local State Forest Districts within some general parameters.

In the consideration of the protection of nature and to secure the experience of low-impact activities, the high-impact activities will be controlled more firmly in the future.

Motorized, very noisy or any other kind of intrusive activities will only be allowed at times and places where they won't conflict too much with the more peaceful activities of other people, such as picnics.

Requests for high-impact activities will be viewed in light of whether the area is really necessary for this activity, or whether it could just as well take place somewhere else. The question of whether the experience of nature is beneficial to those practising outdoor activities and sports is part of the assessment.

The same assessments are valid when viewing applications to establish particular courses for activities such as golf, shooting and moto-cross."
(National Forest and Nature Agency 1995, pp. 8 f).

One of the major non-governmental organizations associated with outdoor recreation in Denmark, the Outdoor Council, has recently issued its outdoor recreation policy programme *Friluftsliv for alle* ('Outdoor Life for Everyone') (Friluftsrådet 1997). In this programme the Outdoor Council states, among other things, that it will:

- 'work broadly to safeguard nature and the environment, so that a basis is created for outdoor activities and healthy surroundings;
- work to create understanding and respect between owners of forests and farms on the one hand and the people who engage in outdoor activities on the other;
- constantly work to improve practical and acceptable access to the natural and production landscape, often by establishing overall national policy solutions;
- work to ensure that, in future amendments of the Agricultural Act, it is evident from the preamble to the Act that agriculture has the dual purpose of producing food etc., and safeguarding the interests of natural history, cultural history, environmental protection and outdoor activities;
- work to ensure that outdoor activities are considered in terms of the environment and developed in a more sustainable direction;
- work to ensure that outdoor activities are considered in all national and international subsidy schemes related to primary production, nature protection and resource utilization;
- work for well-developed international cooperation in the areas of outdoor activities, nature and the environment with due respect for international understanding;

- constantly evaluate its own efforts in the areas of open air activities, nature and the environment in terms of the wish for sustainable development at both the local and global levels.'
  (p. 11; translated from Danish).

- And, more specifically in relation to the forests:

- 'work to ensure that the rules for organized activities in forests and on uncultivated areas are changed so that the rules laid down by the National Forest and Nature Agency for the State forests are also applied to areas owned by other public authorities or by private owners;
- work to ensure that forests and other areas owned by pension funds, institutional investors, organizations, the State Church, public foundations, county and district councils are covered by the same rules for access and use as the State forests;
- work to ensure that the necessary public appropriations and subsidies are obtained for the establishment and management of nature, forest and other areas when the public has been granted access and use as for the State forests.' (p. 43; translated from Danish).

Since some of the above points require changes as regards the private forest owners, the *Danish Forestry Association* (the interest organization of the private forest owners) has reacted to them. Thus we can read the following in an editorial in the journal of the association (*Skoven*), by Berner & Studsgaard (1997):

'...of course we quite agree that is it crucial to the public and the country that everyone can get out into the forests. The forests in particular offer the country's finest natural values and outdoor experiences - including tranquillity - for the whole population. That is why we can also support *one* of the Outdoor Council's many wishes - that is, *more forest*.

But beyond this we disagree with the Outdoor Council's action plan

...

We believe that the extension of the right to access is more the ambition of organizations than a broad popular demand. Most Danes have great respect for property rights - both their own and others'. And people in general are fully satisfied with the potential for outdoor activities in the present legislation.

...

We are pleased by the openness the Outdoor Council has shown in the work with its action programme - and we look forward to working together to find good solutions that will benefit both the public and our forests.'
(p. 161; translated from Danish).

When it comes to the financial appropriations, the political system has announced that society is prepared to bear relatively high costs to cater for the population's need for outdoor activities. For example the National Forest and

Nature Agency spent some DKr 80 million in 1996 in the area of outdoor recreation and informative material on nature (Skov- og Naturstyrelsen 1997, p. 20). The county councils, too, are active in this context: in 1996 they spent some DKr 16 million on improving outdoor recreation options (Amterne i Danmark 1997). In addition to these figures, the municipalities and private landowners spend an unknown amount on the maintenance and improvement of the potential for outdoor (forest) recreation. As for the private forest owners, the report from the Ministry of Agriculture's Committee on Forest Policy concludes: 'The Committee finds that the forests offer such great recreative and research values that it is important that the private forestry sector continues to maintain - and is enabled to maintain - these values.' (Landbrugsministeriet 1986; translated from Danish).

Finally, the state afforestation policy should also be mentioned in this context - a policy whose aim is to double the forest area from about 12 to 25% of the total land area over the next 100 years. Outdoor recreation is often a very important consideration in the planning, subsidizing and establishment of the new forest areas (cf. for example Christensen 1994; Fodgaard 1995; Miljø- og Energiministeriet 1995b, p. 52).

6.2 Goals and objectives

As mentioned above, Danish society in general takes a positive attitude to the issue and is prepared to pay the relatively high cost of meeting the population's need for outdoor recreational activities - and over the last couple of decades the issue has received more and more political and administrative attention. This has increased the need for solid, scientifically researched knowledge of aspects like the recreational use of the countryside and the preferences of the population.

The present dissertation, *Forest Recreation in Denmark from the 1970s to the 1990s*, is more strictly delimited, since only the forest environment is included in the research. The project endeavours to fulfil four aims:

1) In talking about the preferences of the population one could ask: "Why not just ask the *"experts"* (managers, planners and the like) about their *perception* of the forest preferences of the general public?" Paper I (Jensen 1993) examines this question. Although it is concluded that there are more similarities than differences between the experts' perceptions and the preferences of the population, there are misperceptions about roughly a third of the issues under investigation. This indicates that there is a basis for investigating the public's own views on the development of the forests.

2) However, a need for knowledge is not tantamount to a need for new surveys - are there no other surveys whose results can be used? - This question is investigated in Paper II (Jensen 1995) where forest recreation research in *the*

different Nordic countries is compared. This work shows similarities as well as differences among the countries. It is concluded that Norway, Sweden and Finland, in general, have most in common in the area of forest recreation, while Denmark forms a link between the Continent and Scandinavia. The conclusion is that research results cannot be directly transferred to Denmark from the other Nordic countries.

Finally, what about previous research in Denmark - is there any existing research that meets this need for knowledge? Research on Danish forest recreation started with the *Forest and Folk* project at the Danish Forest Experiment Station (now part of the Danish Forest and Landscape Research Institute), where extensive surveys of the population's forest recreation activities and preferences have been conducted. These surveys have been published in four parts: Parts I, II, III and IV of *Forest Recreation in Denmark* (Koch 1978; Koch 1980; Koch 1984 and Koch & Jensen 1988). *But* it is now about twenty years since the first data were gathered for these surveys of the population's use of and wishes for the forests, so one can ask the legitimate question: "Are the results of these surveys still valid?" To answer this question the project *Outdoor Life '95* was started in 1993 in order to *update* the only previous nationwide surveys of recreational forest use and preferences and to analyse the *trends* between 1976 and 1994. This project enables answering the last two aims in question:

3) How has the use of the forest for recreational purposes by the general public changed from the 1970s until the 1990s?

   and

4) Are the forest environment preferences of the general public the same today as they were a couple of decades ago?

The results of this research work are given in Papers III and IV, where the surveys of the population's *use* of the forest are updated and the trends are identified, while developments in *preferences* are also examined (Jensen 1997a and 1997b).

7. SUMMARY OF RESULTS

7.1 Paper I: How do "expert guesses" agree with the forest visitors' preferences?

This paper presents results based on two different methods of investigating landscape managers', students' and politicians' perception of the forest and landscape preferences of the general public. It also gives results for different segments (in terms of education and occupation) of the expert groups. The results are grouped according to the character of the landscape management measures which might influence the quality of outdoor experience.

Introduction: In Danish forest recreation planning up until 1988 (when Koch & Jensen published the survey of the preferences of the general public) there was little knowledge of what visitors wanted from the area in question. Landscape managers were, at least in part, forced to think about their own preferences or to rely on conjectural answers to questions like "How do visitors feel about different management alternatives? What types of recreation facilities do they want to find in the forest? And to what extent?"
One can then ask the obvious question:

"How do these 'expert guesses' agree with what the population - the visitors - actually prefer?"

The paper gives the results of a study of landscape managers', students' and politicians' perception of the forest and landscape preferences of the Danish public. The concept of "managers" has to be understood broadly in this context. The group consists both of people working in the field (e.g. forest owners and people employed by a forest district) and people from the central and local administration who mainly work with planning and nature conservation. People working in related education and research are also classified as managers in this context. The manager group has therefore been divided into different segments, to obtain more detailed and accurate information. The students concerned were mainly students who had attended the lectures in the course *Landscape and Nature Management* at The Royal Veterinary and Agricultural University of Copenhagen (Den Kgl. Veterinær- og Landbohøjskole), - mostly forestry, landscape architecture and agriculture (agronomy) students. A group of politicians has also expressed what they presume to be the preferences of the Danish population. The politicians were all members of the Danish Parliament (and members of the Environmental and Planning Committee of the Parliament). These viewpoints are interesting, as this particular group of politicians is influential in deciding priorities in the environmental sector - including forest recreation.

Method of data collection: Data were collected in connection with various events (e.g. annual meetings, conferences, courses etc.) where it was possible to contact relatively large groups of managers, students or politicians. The number of respondents at each event varied from 20 to 227. The response rate for the investigations was between 85 and 100% (eight of the 19 collections had a response rate of 100%).

Selection of the topics investigated: In the selection of the topics that respondents had to assess, three criteria were important: (a) whether the topic might influence the forest visitor's experience, (b) whether it had a certain economic importance, and/or (c) whether the feature could be regulated by the landscape manager.

The Experimental Method: In the Experimental Method, the topics investigated were presented to the respondents in the form of black-and-white slides. The method involved the use of pairs of photos that were identical except for one factor - namely the factor which was to be assessed. The interviewees were shown 13 pairs of black-and-white slides, and each respondent had to choose between the left or right slide on the screen - or indicate "indifference" on the questionnaire. The assessment criterion was: "Which woodland environment do you think the forest visitors prefer?".
The advantages of the Experimental Method are the experimental layout of the presentation used for the topics under investigation, and the method's ability to cover many topics. The disadvantages of the Experimental Method are that each topic is only represented by a few black-and-white photos/slides, and that these have been picked subjectively. The analyses of the data consisted of simple cross-tabulations and chi-square tests.

The SBE Method: The "*S*cenic *B*eauty *E*stimation Method" was developed by Daniel & Boster (1976), and modified for the Danish investigations by Koch (1977b). The aims of using the SBE Method were to elaborate and control the results of the Experimental Method in relation to preferences for four types of landscape: broad-leaved forest, coniferous forest, the countryside and facilities for forest recreation. The advantages of the SBE Method are the use of colour slides chosen objectively (randomly sampled), and the use of many slides to represent each topic under investigation. In this way the SBE Method counteracts the disadvantages of the Experimental Method. (A disadvantage of the SBE Method is that it is highly resource-intensive). In the SBE Method each respondent assessed 40 colour slides, half the number used in the national survey of the preferences of the population (Koch & Jensen 1988) - and only winter slides were shown to the experts. Each of the four types of landscape was then represented by ten colour slides taken in winter. The colour slides were shown in random order on the screen, and the instructions for awarding points (1 to 10 points) to the slides were given in a text slide which opened the slide show. The rating criterion was: "What do you think the visitors prefer ?".

The data collected using the SBE Method were analysed by calculating the mean rating given to each of the four types of landscape by each respondent, and then comparing two types of landscape by analysing the differences in the respondents' mean ratings of the two types of landscape. (There is a detailed description of the method of analysing the data using the modified SBE Method in Koch & Jensen (1988) - and a comparison with the method proposed by Daniel & Boster (1976)).

Results: The experts' perceptions of the forest and landscape preferences of the population are given for the following issues: nature in general; the silvicultural system; the choice of tree species; regeneration, formation and tending of stands; recreation facilities and influences related to recreational use.
This study of experts' perception of the forest and landscape preferences of the Danish population shows that there are more similarities than differences between the experts' perceptions and the preferences of the population. But not all issues are assessed the same way: in about one third of the issues investigated, the experts' perceptions differ from the preferences of the population. Where do they go wrong? The experts believe that the population prefers the more natural/unmanaged forest - for example, with a broken tree trunk and gnarled oaks. The reason for this bias in the experts' perception *could* be the influence of the more articulate nature conservation groups in society. (It should be noted that some expert groups are aware of the preferences of the population on this topic - perhaps because of better contact with the typical visitor). The experts also believe that a general development of recreation facilities in the forest has stronger support from the public than is actually the case. This misperception may stem from the professional attitude of managers, which suggests that it is necessary to develop the primeval environment to preserve it from abuse by the public - and is perhaps also due to manifestations by certain interest groups and individuals.
It might be expected that the politicians would be further than the other "experts" from a perception which agreed with the preferences of the population. But actually there are close resemblances. Only in three situations do the politicians deviate slightly from the other groups of "experts" - but without being in direct opposition.
Among the experts there are differences. For example, taking the politicians, managers and students together, there is a perception that the public prefers a forest with an exercise structure on a jogging path. Looking only at the managers, a majority of managers with a master's degree in forestry and managers employed by a forest district have a perception which agrees with that of the population - they prefer a forest without any exercise structure. Looking at the students, there are clear differences between the forestry and non-forestry students - where the forestry students are more in tune with the preferences of the population.
It has often been stated that it is dangerous to use considerations based on averages in recreation planning and policy. If a manager tries to consider the "average visitor", only a few visitors will be satisfied. The examples mentioned

above indicate that in perception surveys too it is important to look at the perceptions of different groups (of experts) and not only to use averages. The incisive statement by Shafer, "The Average Camper Who Doesn't Exist" (1969), might with justice also be used in connection with this perception survey - "The Average Expert (Manager-Student-Politician) Who Doesn't Exist".
It is thought-provoking that the results reported in this paper in many cases resemble and elaborate on the results of Hendee & Harris, who published their article, "Foresters' Perception of Wilderness-User Attitudes and Preferences", back in 1970.
To quote Hendee & Harris (1970):

"...since a large share of their work results from problem users, it would be strange indeed if their perception of typical users were free of bias.

...

A continuing challenge to wilderness and other resource managers is to learn about their clientele: who they are, where they come from, and how they feel about management policies."

7.2 Paper II: Are there differences among the Nordic countries in the area of forest recreation?

This paper describes recreational behaviour against the background of the history of Nordic (i.e. Danish, Finnish, Norwegian, Swedish and Icelandic) forest recreation research over the last 25 years. Previous research on forest recreation in the Nordic countries can be characterized as inventory-oriented descriptive studies with a relatively high proportion of the research focused on the mapping of patterns of recreational behaviour. The different countries are compared in terms of selected topics. These comparisons show similarities as well as differences. In general, it seems that Norway, Sweden, and Finland have most in common, while Denmark forms a link between the Continent and Scandinavia, and Iceland assumes a more distinct position. The paper further describes the development of informative work on nature and nature schools in the individual countries, and gives a brief presentation of urban forestry. Finally, the most important future research needs are discussed.

Introduction: An introduction gives a very brief overview of the historical aspect of recreation in the Nordic countries. A range of aspects of the observable use of the forest for recreation is covered. The Nordic countries are compared when possible. With such comparisons it is important to remember that the results derive from different survey methods and cover a relatively long period. Some of the comparisons are thus relatively difficult and uncertain.

Results:
Forest recreation compared with other leisure activities: In general, more than 80-90% of the adult Nordic population visit the forest at least once a year. This is quite a high percentage compared with other leisure activities such as movies, concerts, museums, etc.

Number of visits to the forests: Only Denmark has tried to estimate and describe the recreational use of the individual forest, and the variations in the uses of *all* forest areas in the country (Koch 1980). The investigations carried out in the other countries have only dealt with a few, relatively intensively used forests.

Length of stay and transport time: Results from a Danish survey and results from a quite similar survey in Sweden are compared. It is concluded that the Swedes spend more time on each visit than the Danes, and spend less time on transport to the forest in general. These differences are in accordance with the distribution of forest and residential areas (and perhaps the sense of confidence/security in the forest?) in Sweden compared with Denmark. The length of the stay depends greatly on - for instance - the kind of forest we are talking about. This is well illustrated by a Finnish survey where Sievänen (1993) finds

that the average length of a visit to urban forests is 1.5 hours, while the average for other forest types is 2.6 hours.

Time patterns: Examples of differences and similarities in the visit patterns through the week and the year are given. A Finnish survey by Saastamoinen (1979) and a Swedish survey by Kardell (1982) find that areas very close to or within the city boundary, visits on Saturdays and Sundays, account for a considerably smaller part of the total number of visits than is the case in Danish investigations (Koch 1984). As a contrast to this, there are examples of areas in Norway and Sweden where visits at the weekend account for a higher proportion of the total number of visits than is the case in the Danish investigation (Haakenstad 1975 and Kardell 1972). Most of the investigations compared have the common feature that visits are especially intensive in July and August. Presumably, the fact that tourist visits peak in these months contributes to this. In addition, May, as a month with high foliation, has a large number of forest visits (Kardell 1982, and Koch 1984). And given the berry-picking in autumn, there can be no doubt that in some areas this will be the peak season.

Area use within the forest (dispersion of visitors): Several surveys find considerable variations in the area used within the individual forest; e.g. Koch (1984) and Jensen (1992) in Denmark (Gl. Kjøgegaard and Vestamager); Haakenstad (1975) in Norway (Oslomarka); Kardell (1972, 1982) in Sweden (Bogesundslandet and Linköping); and Sievänen (1989) in Finland. Incidentally, Kardell (1972) finds that the largest area is used in autumn. This is explained by the fact that visitors pick berries and mushrooms at this time of the year. This observation probably applies to many forest areas in Norway and Finland too.

Main activities: When activities in the different Nordic countries are compared, it emerges that activities like walking, cycling and exercising in general are all relatively frequent in all countries. One activity where we really find differences is berry and mushroom picking: the participation rate in Finland is more than 70% (Ulkoilututkimus 1979); and in some specific areas in Norway and Sweden it is as much as 50% (Kardell & Pehrson 1978, Kardell & Holmer 1985, Aasetre 1993). This far exceeds what is found in Denmark. Another area where Denmark and the rest of Scandinavia differ is winter activities like cross-country skiing.

Group size and transportation to the forest: Danes walk alone in the forest a little less frequently than the Swedes, the Norwegians, and especially the Finns. Perhaps fear of the forest is greater in Denmark, a densely populated agricultural country, than in the other Scandinavian countries. The Finns seem to walk alone much more often than all others (here it is important to be aware of the fact that the Finnish survey is restricted to urban forests). There are some minor differences in recreational behaviour in the Nordic countries in connection with the choice of transport to the forest; the number of visitors who walk to the

forest seems to be largest in Norway, while the number of visitors who use a car is largest in Denmark. But common to all the countries is the fact that less than 10% use public transport.

The preferences of the population: Preferences in relation to environmental influences, management influences in connection with recreation facilities (roads and paths) for forest recreation, and recreation influences are discussed briefly. In many cases similar results are found. However there are differences as far as forest roads and paths are concerned: in Denmark forest roads and paths are considered a relatively positive element in the forest environment, and we can conclude that the less specialized and "unnatural" a path is, the more it is preferred by the public. The order of precedence - exercise path, riding path, cycle path - more or less matches public preferences for meeting the three kinds of forest visitors: joggers, riders, and cyclists (Koch & Jensen 1988). Hultman (1983) also finds that forest roads and paths are relatively highly valued in Sweden. This is by far the case in countries where large numbers of new forest roads are established in connection with large cuttings - and wilderness areas. In this respect, Aasetre (1992) lists quite a few surveys where the results indicate mixed feelings about forest roads and paths among Norwegian forest visitors.

Informative work on nature and nature schools: An overview of the development of nature information and nature schools in the Nordic countries shows how all the Nordic countries share the aim of providing children and young people with information about nature and the environment in the educational system, as well as establishing specialized nature schools.

Urban forest and green spaces: Recreation in - or close to - the towns or cities is a relative concept with different meanings according to the situation, and it is to some extent interpreted differently in the different countries. All the Nordic countries attach great importance to good outdoor recreation options in everyday life.

The future: The paper concludes with an overview of the future of forest recreation and forest recreation research. 'It's difficult to foretell - especially about the future', the great Danish humorist Storm P. once said. And this is very pertinent to the problem of assessing the future of outdoor recreation in all the Nordic countries. When we look at perspectives in forest recreation research, we can see that Nordic forest recreation research has had its ups and downs from around 1970 until the present day. Each country has had its "vigorous" periods in this field. On the basis of Kaltenborn (1993), the paper cites some examples of future research topics which seem to suit all the countries to some degree, and in conclusion indicates that cooperation is one of the key words for future progress in Nordic outdoor recreation research.

7.3 Paper III: Have patterns of forest recreation changed in Denmark from the 1970s to the 1990s?

This paper gives results based on two postal questionnaire surveys in 1976/77 and 1993/94 (henceforth referred to as 1976 and 1994) of the recreational use of the forest by the adult (15-76 years old) Danish population. The two surveys are based on samples of 3087 (response percentage 91.4%) and 2916 individuals (response percentage 83.7%) respectively. The main result found is that the use of the forests by the Danish population during the period from 1976 to 1994 has remained relatively stable.

Introduction: Research on Danish forest recreation started with the *Forest and Folk* project, which conducted extensive surveys of the forest recreation activities of the population. These surveys were published in four parts: Parts I, II, III and IV of *Forest Recreation in Denmark* (Koch 1978; Koch 1980; Koch 1984; Koch & Jensen 1988).

It is now about twenty years since the first data for these surveys were gathered. Some of the *aims* of the *Outdoor Life '95* project in 1993 were: (1) to *update* the only previous nation-wide survey of recreational forest use (Koch 1978); (2) to analyse the *trends* between 1976 and 1994 in the use of the forests by the population; and (3) the implementation of new nation-wide surveys which would provide the opportunity to study *new issues* related to the outdoor recreation activities of the population - issues that have become relevant in the period after the surveys in the 1970s.

The Forest and Folk project developed methods for surveying the outdoor life of the Danish population. The surveys in the Outdoor Life '95 project are based on these methods, so we can retain the best possible basis for comparisons between the two projects and thus analyse the trends.

The present paper does not give all the results of the Outdoor Life '95 project. As mentioned above, the project allows us to investigate issues that have not previously been analysed. The paper will only present the themes the survey shares with the previous survey (Koch 1978).

Method: The paper describes how the data on which the results are based were collected and analysed. Data were gathered in two national interview-based surveys in 1976 and 1994, each involving some 3,000 people representing the adult Danish population. Contact was established by means of mailed questionnaires followed by up to three reminders. For representative purposes the mailing of the questionnaires was distributed over a period of one year.

The following measures were taken to increase the response rate: (1) care in the design of the visual appeal of the questionnaire package; (2) care in the design of the verbal prompts; (3) a stamped, addressed reply envelope; (4) a relatively brief, simple questionnaire; (5) a potential personal gain for respondents (lottery - only in the 1976 survey); (6) the use of up to three reminders, mailed after 2, 3 and 5 weeks.

Various types of error associated with this type of survey are discussed in the paper: (1) sampling errors; (2) non-response errors; (3) measurement errors; and (4) errors due to coding, editing and tabulating.

Results:
Number of forest visits and forest visitors: In both 1976 and 1994 about 90% of the adult Danish population spent some time in the forest at least once a year. The average annual *number* of forest visits per individual has grown by 15% from 1976 to 1994. This corresponds to a rise between 1976 and 1994 of just under 25% in the number of visits to the Danish forests by persons between the ages of 15 and 76 - allowing for population growth. It should be emphasized here that one of the great disadvantages of collecting information from questionnaires is the risk of *exaggeration*. The exaggeration factor *is estimated* here to be of the order 3, which means that *the total annual number of forest visits in 1994 for the adult Danish population is estimated at some 50 million.*
The *average* annual number of forest visits is not an expression of "ordinary" behaviour (skewed distribution). The relatively few people who go very frequently to the forest will raise the average to an atypically high level. One can get a more characteristic measure by looking at the frequency of visits by the *mid-most person* in the material. This person - the so-called *median Dane* - went to the forest about 11 times in 1976 and about 10 times in 1994. The rise in the average number of visits can thus be attributed to an increasing number of frequent forest visitors who have a relatively significant effect on the average figure. That the median figure at the same time drops from 11 to 10 visits is due to the fact that, at the same time, a proportionally higher percentage of the population went fewer times to the forest in 1994 than in 1976.
It can be concluded that the forests attracted a considerably higher *percentage* of the adult Danish population than the cinemas, libraries, art exhibitions, theatres and concert halls (both in 1976 and 1994). The forests have thus been able to maintain (strengthen) their position as a very significant recreation option for the population - over a period where leisure options have constantly increased. Finally, it is noteworthy that some 2/3 of the forest visits in 1994 were to the forest closest to the home - a result which indicates the pressure on the forests in the urban fringe.

Duration of forest visits: In the period 1976-1994 there was a change towards shorter forest visits. It can be estimated that the *average* visit duration was 1.9 hours, with a *median* value of 1.6 hours in 1976. These figures had dropped in 1994 to 1.8 and 1.1 hours respectively.

Group size on the forest visits: In both surveys it has been noted that close to 80% of the forest visitors' last visits were in groups of four or fewer persons - but with a striking shift towards groups of one or two persons in 1994. The tendency towards a higher number of small groups rather than medium-size groups - "family groups" - of 3-6 persons accords well with the general development of the population in Danish society. In addition to the shift towards the

smaller groups there was also a trend towards more visitors in larger groups - a polarization which might be due to the increase in opportunities to take part in organized events.

Activities during the forest visits: The following can be established in connection with both the 1976 and the 1994 survey: about two thirds of the forest visitors had among other things gone for walks on their last forest visits. Just over half had "enjoyed nature", while exercise, sitting still, going for a drive and walking the dog are activities that were all ticked off by 10-15% of the forest visitors. Activities like riding, hunting and fishing were engaged in by relatively few visitors to the forest (1-2%). There have been no striking changes in the activities over the last 20 years or so.

Transport time, transport distance and means of transport to the forest: The average transport time spent per forest visitor on the journey out on the last forest visit was 30 minutes in 1976 - in 1994 the transport time had decreased by 10%. The average transport distance also dropped in the 18-year period: from 10.5 km to 8.5 km. In 1976 the car was the absolutely most frequently used transport type for forest visits, followed by walking and cycling. In 1994 too, the car was the absolutely most frequently used means of transport (49%), while walking (32%) or cycling (11%) came next in order as in 1976. The ranking of transport types is thus unchanged. This is however not the case with the relative distribution of the various ways of getting to the forest: in the 18-year period between the two surveys there was a striking change towards more people walking/running or cycling to the forest rather than using the car.

The transport distance has a crucial effect on the choice of transport type. In both 1976 and 1994 the forest visitors mainly walked to the forest when it was within a distance of about 2 km from the starting point. Cycles were used by a relatively large percentage of the forest visitors for distances of 1-8 km in 1976 and 1-15 km in 1994. If the forest visit was more than 3 km from the starting point, about half of the forest visitors drove by car to the forest.

The connection of forest use with transport time, distance and type thus leaves the following main impression: the shorter the transport time/distance on the forest visit, the more frequent the visits to the forest, the shorter the visit to the forest, the fewer participants in the group and the rarer the use of a car to get to the forest - an impression which at the same time illustrates the general direction in which Danish forest recreation has developed over the last 20 years.

7.4 Paper IV: Have forest preferences changed in Denmark from the 1970s to the 1990s?

This paper gives results based on two postal questionnaire surveys in 1977/78 and 1993/94 (henceforth referred to as 1977 and 1994) of the forest preferences of the adult (15-77 years old) Danish population. Representative samples of 2826 (response percentage 89.4%) and 2916 individuals (response percentage 83.7%) respectively form the basis of the two surveys. The "Experimental Method" was used to measure the preferences of the population: 52 black-and-white photos (plus 12 new photos in the 1994 survey) and 100 verbal stimuli which were pairwise or groupwise identical except for one feature - the topic under investigation - were used to represent the forest. The main result found was that the forest preferences of the Danish population have remained very stable during the period from 1977 to 1994.

Introduction: A number of arguments in favour of surveying the forest preferences of the general public are adduced: (1) society is apparently prepared to pay relatively high costs to satisfy the population's need for outdoor recreational activities; (2) several surveys have shown that forest and landscape managers' own preferences - or their perception of visitors' preferences - do not always agree with the visitors' preferences; (3) inadequate knowledge of the preferences of forest visitors makes it easy for the forest manager to fall victim to what can be called management according to the "the squeaking wheel principle": 'the wheel that squeaks the loudest gets the oil'.
There has been forest and landscape preference research since the mid-sixties. Because it is a relatively new research field, few studies seem to have dealt with changes in preferences over time, and as for studies of the trends in a country's *general population* the number seems infinitesimally small (zero?).
Only one nation-wide survey of Danish forest preferences had been conducted before the launching of the *Outdoor Life '95* project in 1993 - Part IV of *Forest Recreation in Denmark* in the *Forest and Folk* project (Koch & Jensen 1988). It is now more than fifteen years since the first data for these surveys of population preferences were gathered. Some of the *aims* of the Outdoor Life '95 project were: (1) to *update* the only previous nation-wide survey of recreational forest preferences; (2) to analyse the *trends* between 1977 and 1994 in the forest preferences of the population; and (3) the implementation of a new nation-wide survey, providing opportunities to study *new issues* - issues that have become relevant in the period after the survey in the 1970s. In the Forest and Folk project, methods were developed for surveying the outdoor life of the Danish population. The surveys in the Outdoor Life '95 project were based on these methods in order to maintain the best possible basis for comparing the results of the two projects and thus analysing the trends.

Method: The paper describes how the data on which the results are based were collected and analysed. Data were gathered in two national interview-based

surveys in 1977 and 1994, each involving some 3,000 people representing the adult Danish population. Contact was established by means of mailed questionnaires followed by up to three reminders, and several measures were taken to increase the response rate. To achieve representativity, the mailing of the questionnaires was distributed over a period of one year, since the season is assumed to be a factor that influences forest preferences.

At the Danish Forest and Landscape Research Institute, the *Experimental Method* has been developed. In choosing the topics to be assessed by the selected persons, we attached considerable importance to the following factors: (1) whether the topic was likely to impact on the experience of the forest visitor; (2) whether it had any commercial or socioeconomic significance; and/or (3) whether the conditions described could be regulated by the forest manager.

In the Experimental Method, respondents assess *black-and-white photos* which taken in pairs or groups only differ in a single factor. In addition, a series of less ambiguous subjects, only described verbally, were assessed. Each individual had to make his or her assessment by *ranking* seven randomly selected photos and seven randomly selected *verbal stimuli*. This method, which was developed by Koch (1974, 1977a and 1977b), is distinctive in its experimental design and its ability to cover many survey topics.

A total of 52 black-and-white photos were assessed in the 1977 survey and 64 in the 1994 survey. The reader may refer to Jensen & Koch (1997), where the photos are reproduced in the same size and quality as those mailed with the questionnaires. When the photos were taken, great care was taken to ensure that photos in a given "block" appeared as uniform as possible.

A total of 100 verbal stimuli were to be assessed in both surveys (Koch & Jensen 1988; Jensen & Koch 1997) and these were printed in green, on yellow cards of the same size as the black-and-white photos (98 x 134 mm).

Certain survey topics were to be assessed on the basis of both a photo *and* a verbal stimulus, as this made cross-checking possible.

The following techniques were used to elicit the population's preferences:

Black-and-white photo questions: Of the total of 52/64 black-and-white photos of different forest environments, 7 photos were randomly selected for each interviewee and appended to the questionnaire in a red envelope. Guided by explanations printed on the questionnaire and envelope, interviewees were asked to rank the 7 photos according to the criterion "Which woodland environment do you prefer to visit?".

Verbal stimuli questions: Of the total of 100 verbal stimuli, 7 cards with verbal stimuli were randomly selected for each interviewee and appended to the questionnaire in a blue envelope. The interviewees were asked to rank the text on the 7 cards according to the criterion "What do you prefer to meet in the woods?".

Thus the survey produced a series of independent rankings, by a representative sample of the population, of a number of different topics (presented as

black-and-white photos and/or verbal stimuli), in a number of different, randomly selected combinations. On average, each photo was ranked about 335 and 260 times and each verbal stimulus about 175 and 165 times by the respondents in the two surveys respectively. And thus a basis was obtained for comparing the internal ranking of the photos and the verbal stimuli.
The reason for using only 7 photos and 7 verbal stimuli per respondent is that respondents experience difficulty in ranking a greater number of topics on the same occasion.
Finally, various errors associated with this type of survey are discussed in the paper: (1) sampling errors; (2) non-response errors; (3) measurement errors; and (4) errors due to coding, editing and tabulating.

Results: - *Are* desires/preferences, then, changing over time? The final report on the survey with the data collected in 1977 was not written until 1988. The summary of that survey stated: 'It is possible that the preferences of the general public have changed between 1977/1978 and 1988. We do not *presume* that there have been general major changes in the preferences in question - supporting the supposition in foreign surveys - although it would be interesting to investigate this question more closely.' (translated from Koch & Jensen 1988, p. 364). The postulate that the preferences of the Danish population have not changed can be demonstrated to be correct. The results reported here show that it has *not* been possible to detect major changes in the preferences of the general Danish population over a period of more than 15 years.
Minor changes have been found in the Danes' preferences from 1977 to 1994 in relation to a few topics:

- An old beech forest undergoing natural regeneration is less pronounced preferred to the same beech stand without understorey;
- large unit forestry is preferred to small unit forestry, a result which seems to be more marked in 1994;
- popularity increases as the age of the stand increases, a result which was only found for beech in 1977 but in 1994 was also found for Norway spruce;
- the use of fertilizers, herbicides for weeding, and mechanization in general in the forest has declined further in popularity;
- there appears to be a tendency to prefer "natural untidiness" to "man-made untidiness";
- a tendency towards less preference for various kinds of paths and visitor facilities in general;
- signs stating that open fires are prohibited are becoming more unpopular;
- information on "*why*" a given measure has been implemented has become more popular during the period;
- meeting other forest visitors (and dogs) in general is decreasing in popularity.

It is difficult to sum up these minor trends in Danish forest preferences in a single formulation; but one could say that management measures which are

alien to a *natural* environment are judged more and more negatively by the Danish population.

When we compare the relatively few studies of trends in forest preferences, the overall conclusion is that the preferences studied have in general remained quite stable over time - at least over a decade or two. This conclusion is supported by Smith (1994), whose paper "Is There Real Opinion Change?" asserts that "Most opinion change is slow and steady".

8. CONCLUSION

Working/leisure/holiday time, as well as legislation and policy on outdoor recreation, are changing. Over the last couple of decades outdoor (forest) recreation has received more and more political and administrative attention. This has increased the demand for sound knowledge of the recreational use of the forests as well as the forest preferences of the population.

It has been demonstrated that the following four questions need to be answered:

I. Is it necessary to ask the general public about their forest preferences? Why not just ask the *"experts"* (managers, planners and the like) about their *perception* of the preferences of the population?
II. Once a need for knowledge has been established, is it possible to utilize other surveys (e.g. from abroad) - or are new surveys necessary?
III. How has the use of the forest for recreational purposes by the general public changed from the 1970s until today?
IV. Are the forest environment preferences of the general public the same today as they were a couple of decades ago?

The answers to these questions, briefly, are:

Re I: Paper I (Jensen 1993) examines this question. The study of experts' perceptions of the forest and landscape preferences of the Danish population shows that there are more similarities than differences between the experts' perceptions and the preferences of the population. But not all issues are assessed in the same way: in about one third of the issues investigated, the experts' perceptions differ from the preferences of the population. Where do they go wrong? The experts believe that the public prefer the more natural/unmanaged forest - for example, with a broken tree trunk and gnarled oaks (influenced by the more articulate nature conservation groups in society?). The experts also believe that general development of recreation facilities in the forest has stronger support from the public than it actually has. It has often been said that it is dangerous to base recreation planning and policy on "averages". The experts themselves differ, and the present study proves that in perception surveys too it is important to look at the perceptions of different groups of experts, not only at averaged-out versions of their views - the problem of "The Average Expert (Manager-Student-Politician) Who Doesn't Exist". Finally, we might expect that the politicians, "standing aloof from the world", would have perceptions further than those of the other "experts" from the preferences of the public - but there are actually close resemblances.

re II: This question is investigated in Paper II (Jensen 1995) which compares forest recreation research in the different Nordic countries. It shows that there are similarities as well as differences. It concludes that Norway, Sweden and Finland, in general, have most in common in the area of forest recreation, while Denmark forms a link between the Continent and the rest of Scandinavia. The paper concludes that research results cannot be directly transferred to Denmark from the other Nordic countries.

re III: Paper III (Jensen 1997a) discusses this question. It can be concluded that the forests attract a considerably higher percentage of the adult Danish population than other leisure options like cinemas, libraries, art exhibitions, theatres and concert halls (both in 1976 and 1994). The forests have thus been able to maintain (strengthen) their position as a very significant recreation option for the public, over a period in which leisure options have constantly increased. The main result found is that the uses of the forest by the Danish population over the period 1976-1994 have remained relatively stable. There have only been minor changes, including an increase in the number of visits to the forest, and a decrease in the duration of the visits, in transport time, transport distance and group size. Finally, it has been established that more forest visitors walked or cycled to the forest rather than driving there by car in 1994 than in 1976.

re IV: The question of preferences is dealt with in Paper IV (Jensen 1997b). The main result found was that the forest preferences of the Danish population remained very stable in the period 1977-1994. No radical alteration in preferences was found - there were only a few minor changes/confirmations, for example in preferences as regards natural regeneration; large/small unit forestry; the age of the forest stand; the use of herbicides and fertilizers; paths and visitor facilities; the provision of information; and meeting other forest visitors.

To sum up:

A. It is relevant to look at the preferences of the actual users - the forest visitors.

B. It is necessary to establish research locally.

C. The use of the forests, and behaviour and preferences in connection with forest recreation, have remained relatively stable in Denmark - at least over a couple of decades.

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10. REFERENCES

Aasetre, J. 1992: Friluftsliv og skogbruk - En litteraturstudie. - Norsk institutt for naturforskning, NINA utredning 34, Lillehammer, 52 pp.

Aasetre, J. 1993: Friluftsliv i skog. - *In:* Vårt friluftsliv - Aktiviteter, miljøkrav og forvaltningsbehov. Kaltenborn, B.P. & Vorkinn, M. (ed.). - Norsk institutt for naturforskning, NINA Temahefte nr. 3, Lillehammer, pp. 25-32.

Amterne i Danmark (ed.) 1997: Amterne i naturen 1996. - Amterne i Danmark, Amtsrådsforeningen, København, 43 pp.

Berner, G. & Studsgaard, H. 1997: Friluftsliv for alle. - Skoven 29: 161.

Bonke, J. (ed.) 1997: Levevilkår i Danmark. Statistisk oversigt 1997. (Living Conditions in Denmark. Compendium of Statistics 1997. - Danmarks Statistik, Socialforskningsinstituttet, København, 443 pp.

Christensen, J. Bjerregaard 1994: Danmark fordobler sit skovareal. - Natur og Miljø 1994(4): 16-19.

Daniel, T.C. & Boster, R.S. 1976: Measuring Landscape Esthetics: The Scenic Beauty Estimation Method. - USDA. Forest Serv. Res. Pap. Rocky Mt. For. Range Exp. Sta., RM-167, 66 pp.

Den Store Danske Encyklopædi (ed.) 1994: Bind 1. - Danmarks Nationalleksikon A/S, København, 616 pp.

Den Store Danske Encyklopædi (ed.) 1995a: Bind 2. - Danmarks Nationalleksikon A/S, København, 628 pp.

Den Store Danske Encyklopædi (ed.) 1995b: Bind 3. - Danmarks Nationalleksikon A/S, København, 628 pp.

Den Store Danske Encyklopædi (ed.) 1996: Bind 6. - Danmarks Nationalleksikon A/S, København, 630 pp.

Douglass, R.W. 1975: Forest Recreation. - Pergamon Press Inc., New York, Second Edition, 336 pp.

Driver, B.L., Brown, P.J. & Peterson, G.L. 1991: Research on Leisure Benefits: An Introduction to This Volume. - *In*: Benefits of Leisure. Driver, B.L., Brown, P.J. & Peterson, G.L. (ed.). - Venture Publishing Inc., State College, Pennsylvania, pp. 3-11.

Fodgaard, S. 1995: Nye statsskove i 1994. - Skoven 27: 390-391.

Friluftsrådet (ed.) 1997: Friluftsliv for alle. - Friluftsrådet, København, 104 pp.

Fritzbøger, B. 1994: Kulturskoven. Dansk skovbrug fra oldtid til nutid. - Gyldendalske Boghandel, Nordisk Forlag A/S, København, 440 pp.

Hansen, J. Schjerup 1989: Natursyn og planlægning. - Statens Byggeforskningsinstitut, SBI-Byplanlægning 58, Hørsholm, 121 pp. (English summary).

Haakenstad, H. 1975: Skogskjøtsel i rekreasjonsområder. Skog og friluftsliv i to modellområder i Oslomarka. - Institutt for Skogskjøtsel, Norges Landbrukshøgskole, Ås, 174 pp. (English Summary).

Helms, Johs. 1917: Referat. Naturfredningsloven. - Dansk Skovforen. Tidsskr., København, Bind II (1917): 439-442.

Hendee, J.C. & Harris, R.W. 1970: Foresters' Perception of Wilderness-User Attitudes and Preferences. - J. For. 68: 759-762.

Hultman, S-G. 1983: Allmänhetens bedömning av skogsmiljøers lämplighet för friluftsliv. 2. En rikstäckande enkät. - Sveriges Lantbruksuniversitet, Avd. för landskapsvård, Rapport nr. 28, Uppsala, 91 pp. (English Summary).

Jensen, F. Søndergaard 1992: Befolkningens anvendelse af Vestamager til friluftsliv, 1985-88. - Forskningscentret for Skov & Landskab, København, 138 pp. - Manuscript.

Jensen, F. Søndergaard 1993: Landscape managers' and politicians' perception of the forest and landscape preferences of the population. - For. & Landsc. Res. 1: 79-93.

Jensen, F. Søndergaard 1995: Forest recreation. - *In*: Multiple-use forestry in the Nordic countries. Hytönen, M. (ed.). - The Finnish Forest Research Institute, Helsinki, pp. 245-278.

Jensen, F. Søndergaard 1997a: Forest recreation in Denmark from 1976 to 1994. - Manuscript.

Jensen, F. Søndergaard 1997b: Changes in the forest preferences of the Danish population from 1977 to 1994. - Manuscript.

Jensen, F. Søndergaard & Koch, N. Elers 1997: Friluftsliv i skovene 1976/77 - 1993/94. - Forskningsserien nr. 20, Forskningscentret for Skov & Landskab, København, 215 pp.

Kaltenborn, B.P. 1993: Hva så? - Noen utfordringer i forskningen på og forvaltningen av friluftsliv. - *In:* Vårt friluftsliv - Aktiviteter, miljøkrav og forvaltningsbehov. Kaltenborn, B.P. & Vorkinn, M. (ed.). - Norsk institutt for naturforskning, NINA Temahefte nr. 3, Lillehammer, pp. 136-139.

Kardell, L. 1972: Bogesundslandet som rekreationskälla. En studie av ett skogsområdes utnyttjande til rörligt friluftsliv. - Forskningsstiftelsen Skogsarbeten, redegörelse nr. 4, Stockholm, 40 pp. (English Summary).

Kardell, L. 1979: Farfars friluftsliv - om han hade något. - Sveriges Skogsvårdsförb. Tidskr., Stockholm, 1 (1979): 6-21.

Kardell, L. 1982: Hur Linköpingsborna utnyttjar sina stadsnära skogar. - Sveriges Lantbruksuniversitet, Avd. för landskapsvård, Rapport nr. 23, Uppsala, 86 pp.

Kardell, L. & Pehrson, K. 1978: Stockholmarnas friluftsliv: vanor och önskemål. En enkät- och intervjustudie. (Stockholmers Outdoors: Use of nature areas. A mail questionnaire and a home interview study). - Sveriges Lantbruksuniversitet, Avd. för landskapsvård, Rapport nr. 13, Uppsala, 112 pp.

Kardell, L. & Holmer, M. 1985: Friluftslivets förändringar på Bogesundslandet 1969-1982. - Sveriges Lantbruksuniversitet, Avd. för landskapsvård, Rapport nr. 33, Uppsala, 117 pp.

Koch, N. Elers 1974: Århusskovenes friluftsfunktion. Undersøgelser over publikums anvendelse af og krav til Århus Kommunes Skovdistrikt. - Skovbrugsinstituttet, Den kgl. Veterinær- og Landbohøjskole, København, 135 pp. + 2 appendix.

Koch, N. Elers 1975: Skovenes friluftsfunktion. Problemanalyse. - Projekt Skov og Folk. Arbejdsnotat nr. 1. - Statens forstlige Forsøgsvæsen, København, 45 pp.

Koch, N. Elers 1977a: Skovenes friluftsfunktion. Præferencemåling. Tidligere anvendte metoder. - Projekt Skov og Folk. Arbejdsnotat nr. 4. - Statens forstlige Forsøgsvæsen, København, 134 pp.

Koch, N. Elers 1977b: Skovenes friluftsfunktion. Præferencemåling. Metodeforslag. - Projekt Skov og Folk. Arbejdsnotat nr.5. - Statens forstlige Forsøgsvæsen, København, 63 pp.

Koch, N. Elers 1978: Skovenes friluftsfunktion i Danmark. I. del. Befolkningens anvendelse af landets skove. (Forest Recreation in Denmark. Part I: The Use of the Country's Forests by the Population). - Forstl. Forsøgsv. Danm., København, 35 (1978): 285-451.

Koch, N. Elers 1980: Skovenes friluftsfunktion i Danmark. II. del. Anvendelsen af skovene, regionalt betragtet. (Forest Recreation in Denmark. Part II: The Use of the Forests Considered Regionally). - Forstl. Forsøgsv. Danm., København, 37(1980): 73-383.

Koch, N. Elers 1984: Skovenes friluftsfunktion i Danmark. III. del. Anvendelsen af skovene, lokalt betragtet. (Forest Recreation in Denmark. Part III: The Use of the Forests Considered Locally). - Forstl. Forsøgsv. Danm., København, 39(1984): 121-362.

Koch, N. Elers 1986: Forskning omkring friluftslivet. Et forsøg på en oversigt over kvantitative forskningsmetoder og en systematisering af forskningsområdet. - Forlaget Bavnebanke, Gerlev Idrætshøjskole, Centring 7 (1986): 232-242.

Koch, N. Elers & Jensen, F. Søndergaard 1988: Skovenes friluftsfunktion i Danmark. IV. del. Befolkningens ønsker til skovenes og det åbne lands udformning. (Forest Recreation in Denmark. Part IV: The Preferences of the Population). - Forstl. Forsøgsv. Danm., København, 41(1988): 243-516.

Landbrugsministeriet (ed.) 1986: En fremtidig skovpolitik. Betænkning fra Landbrugsministeriets skovpolitiske udvalg. - Landbrugsministeriet, Betænkning nr. 1090, december 1986, København, 125 pp.

Lindhagen, A. 1996: Forest Recreation in Sweden. Four Case Studies Using Quantitative and Qualitative Methods. - The Swedish University of Agricultural Sciences, Department of Environmental Forestry, Uppsala, Report ISRN SLU-SLV-R-64-SE. (misc. pp.) (English summary).

Miljøministeriet (ed.) 1986: Ud i det fri - om fritid og friluftspolitik. - Miljøministeriet, Miljøskrift nr. 2 1986, København, 64 pp.

Miljø- og Energiministeriet (ed.) 1995a: Natur- og Miljøpolitisk Redegørelse 1995. - Miljø- og Energiministeriet, København, 573 pp.

Miljø- og Energiministeriet (ed.) 1995b: Natur- og Miljøpolitisk Redegørelse 1995. Sammenfatning. - Miljø- og Energiministeriet, København, 94 pp.

National Forest and Nature Agency (ed.) 1989: Act of forests-Denmark. - Ministry of Environment and Energy, the National Forest and Nature Agency, Copenhagen, 18+6 pp.

National Forest and Nature Agency (ed.) 1995. Experiencing the State Forests. Outdoor life on the areas of the National Forest and Nature Agency. - Ministry of Environment, the National Forest and Nature Agency, Copenhagen, 48 pp.

Nordiska ministerrådet (ed.) 1997: Allemansrätten i Norden. - Nordiska ministerrådet, TemaNord 1997:501, København, 42 pp + 1 appendix. (English summary).

Saastamoinen, O. 1979: Valaistun hiihtoreitin käytön ajallinen vaihtelu. (Summary: Time patterns in the use of an urban skiing route). - Silva Fennica 13: 101-106.

Schwarz, C.F., Thor, E.C. & Elsner, G.H. 1976: Wildland Planning Glossary. - USDA Forest Serv. Gen. Tech. Rep. Pac. Sthwest For. Range Exp. Sta., PSW-13, 252 pp.

Seedorff, P. Paludan 1994: Mennesket og Skoven. Et Studium i Menneskets Opfattelse af Skoven i Perioden 1750 til 1950 belyst ved Periodens Skønlitteratur. - Hovedopgave ved Den Kgl. Veterinær- og Landbohøjskole, Institut for Økonomi, Skov og Landskab, Sektion for Landskabsarkitektur, 181 pp.

Shafer, E.L., Jr. 1969: The Average Camper Who Doesn't Exist. - USDA Forest Serv. Res. Pap. Ntheast. For. Exp. Sta., NE-142, 27 pp.

Sievänen, T. 1989: The trail inventory and forest recreation. - *In:* Multiple Use of Forests - Economics and Policy. Proceedings of the Conference held in Oslo, Norway, May 1988. Mattson, L. & Sødal, D.P. (ed.). - Scandinavian Forest Economics. No. 30, Helsinki, pp. 89-105.

Sievänen, T. 1993: Kaupunkiväestön ulkoilukäyttäytyminen ja ulkoilualueiden käyttö. Hämeenlinnan ulkoilututkimus. (Outdoor recreation household survey in the City of Hämeenlinna. - Folia Forestalia 824, Helsinki, 62 pp.

Skov- og Naturstyrelsen (ed.) 1997: Årsberetning 1996. - Miljø- og Energiministeriet, Skov og Naturstyrelsen, København, 57 pp.

Smith, T.W. 1994: Is There Real Opinion Change?. - International Journal of Public Opinion Research 6: 187-203.

Ulkoilututkimus 1979: Sisäasianministeriön ympäristönsuojeluosaston julkaiso C1 n:o 5. - Helsinki.

Worm, K. (ed.) 1980: Levevilkår i Danmark. Statistisk oversigt 1980. (Living Conditions in Denmark. Compendium of Statistics 1980. - Danmarks Statistik, Socialforskningsinstituttet, København, 336 pp.

PAPER I

Landscape managers' and politicians' perception of the forest and landscape preferences of the population

Frank Søndergaard Jensen (1993)

Forest & Landscape Research 1: 79-93.

For. & Landsc. Res. 1993: 1: 79-93

Landscape Managers' and Politicians' Perception of the Forest and Landscape Preferences of the Population

Jensen, Frank Søndergaard. Landscape managers' and politicians' perception of the forest and landscape preferences of the population. For. & Landsc. Res. 1993: 1: 79-93.

Results based on two different methods of investigation of landscape managers', students' and politicians' perception of the forest and landscape preferences of the Danish general population are given. Results for different segments (in terms of education and occupation) of the expert groups are also given. The results are grouped according to the character of the landscape management actions which might influence the quality of an outdoor experience. It is concluded that in about two thirds of the issues under investigation, similarities exist between the experts' perceptions and the preferences of the population. Misperceptions are found in connection with recreation facilities and more unmanaged forests with dead trees and gnarled stems. Different groups of experts also differ in their perception of population preferences. The importance of contact between the managers and the general population is stated.

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Key words: forest recreation, preference estimation, experts' perception, SBE, interviewing.

Introduction

In Danish forest recreation planning up untill 1988 (where Koch & Jensen published their survey on the preferences of the general population) there was a lack of knowledge of what the visitors wanted from the area in question. Landscape managers have at least in part been forced to turn to their own preferences or rely on conjectural answers to questions like: How do visitors feel about different management alternatives? What types of recreation facilities do they want to find in the forest? - And to what extent? Sometimes the answers to these questions are influenced by manifestions from the more articulate interest groups. One can ask the obvious question: "How do these 'expert guesses' agree with what the population - the visitors - actually prefers?".

When elaborating multiple-use forest and landscape planning (which include the recreational aspect) a number of different objects has to be taken into consideration. It is important to emphasize that preference and perception surveys

should only be a part of the decision basis. Preference and perception surveys cannot and should not relieve the managers of a professional responsibility for developing specific qualities of a specific area.

This paper gives the results of a study of landscape managers', students' and politicians' perception of the forest and landscape preferences of the Danish population. The concept "managers" has to be understood broadly in this context. The group consists both of people working in the field (e.g. forest owners and persons employed by a forest district) and people from the central and local administration who mainly work with planning and nature conservation. Persons in education and research are also classified as managers. The manager group has therefore been divided into different segments, to obtain more detailed and accurate information.

Regarding the group of students, they were mainly students who attended the lectures in the course "Landscape and Nature Management" at The Royal Veterinary and Agricultural University of Copenhagen (Den Kgl. Veterinær- og Landbohøjskole) - mostly forestry, landscape architecture and agriculture (agronomy) students.

We also got a group of politicians to express what they presume to be the preferences of the Danish population. The politicians were all members of the Danish Parliament (and members of the Environmental and Planning Committee of the Parliament (Folketingets Miljø- og Planlægningsudvalg)). These viewpoints are interesting as this particular group of politicians is influential in deciding priorities in the environmental sector, which include forest recreation.

Methods of data collection

The forest and landscape preferences of the Danish population are described in part four of the Project "Forest and Folk" (Koch & Jensen 1988). In this paper the landscape managers', students' and politicians' perception of the preferences of the visitors are compared with the results found in that national investigation. The perception results presented here were obtained by having parts of the questionnaire material (photos or slides) from the national investigation assessed by the different "expert groups".

The left side of Fig. 1 gives an overview of the national investigation carried out to estimate the preferences of the Danish population (Koch & Jensen 1988). The following notes explain the schematic overview of the perception investigations presented in this paper (the right side of Fig. 1):

1) Method of data collection: Data were collected in connection with different arrangements (e.g. annual meetings, conferences, courses etc.), where it was possible to contact relatively large groups of managers, students or politicians. Altogether, 19 collections of data were made during the ten-year period. The number of respondents at each arrangement varied from 20 to 227.

2) Selection of the topics investigated: In the selection of the topics that respondents had to assess, three criteria were important: (a) whether the topic

Preference estimations made at Project »Forest and Folk«			
Publication	**PART IV** (Koch & Jensen 1988)		**THIS PAPER**
Aim	To investigate the forest and landscape preferences of the population and of different segments of the population.		To investigate the perception by expert groups of the preferences of the population.
Sub-investigations	**The Experimental Method** (postal questionnaires)	**The SBe Method** (personal interviewing)	**Personal Interviewing of Selected Expert Groups**
Method of Data Collection	*Questionnaire survey* of 2,826 individuals representing the population (16-77 years).	*Personal interviewing* of 216 individuals representing the population (16-77 years) at their home.	*Personal interviewing* of selected groups of landscape managers, students and politicians.
Period of Data Collection	April 1977–April 1978	November 1977–November 1978	1979–1989
Presentation Form of the Landscape (the Stimuli)	52 *black and white photos*, which pair- or groupwise are alike except for one factor, and 100 *verbal stimuli.*	160 *colour slides* randomly sampled from 4 types of landscape: broadleaved forest, coniferous forest, the countryside, and facilities for forest recreation. *Promotion* of broadleaved/coniferous forest is tested as verbal stimuli.	A selection of the same *photos* or *slides* as used in the Experimental or in the SBe Method in part IV.
Response Formats	*Ranking* of 7 randomly sampled photos and 7 randomly sampled verbal stimuli.	*Ratings* of 80 summer or winter slides. Each type of landscape is represented by 20 summer and 20 winter slides.	*Closed response format* when assessing pairwise the photos from the Experimental Method. *Ratings* when assessing the SBe-slides.
Response-percentage	89.4 %	87.9 %	Varying from 85 % to 100 %
Results regarding	*The preferences of different segments of the population* for the 52 black and white photos and the 100 verbal stimuli, and *the regional and seasonal variation* in these preferences.	*Elaborating and controlling the Experimental Method* regarding the preferences for the 4 types of landscape, and one test of *the effect of promotion on the preferences for broadleaved/coniferous forest.*	*The landscape managers', students' and politicians' perception of the preferences of the population.* Including results from *different expert groups.*

Fig. 1. *Overview of some of the forest and landscape preference investigations carried out at Project "Forest and Folk".*

might influence the forest visitor's experience, (b) whether it had a certain economic importance, and/or (c) whether the feature could be regulated by the landscape manager.

3) The Experimental Method: In the Experimental Method the topics investigated were presented to the respondents in the form of black and white slides.

The Experimental Method involved the use of pairs of photos (slides) that were identical except for one factor, namely the factor to be assessed. In taking the photos, great importance was attached to making the photos in the same pair appear as alike as possible - with the exception of the factor under assessment, cf. Fig. 2 for the 13 pairs of photos which were used in the investigations.

The interviewees were shown the 13 pairs of black and white slides in the order shown in Fig. 2. Each respondent had to choose between the left or right slide on the screen - or indicate "indifference" on the questionnaire. The assessing criterion was: *"Which woodland environment do you think the forest visitors prefer?"*.

The advantages of the Experimental Method are the experimental lay-out of the presentation used for the topics under investigation, and the method's ability to cover many topics. The disadvantages of the Experimental Method are that each topic is only represented by a few black and white photos/slides, and that these have been picked subjectively.

Analyses of the data gained using the Experimental Method were carried out by simple cross-tabulations and chi-square tests.

4) The SBE Method: "The Scenic Beauty Estimation Method" - was developed by Daniel & Boster (1976), and modified for the Danish investigations by Koch (1977). The modifications consist of using a different method of analysing the data (see below), using a random sample of the Danish population as respondents in the investigation of the preferences of the population, and using colour slides of four types of landscape randomly sampled from all over Denmark.

The aims of using the SBE Method were to elaborate and control the results of the Experimental Method regarding preferences for four types of landscape: broadleaved forest, coniferous forest, the countryside and facilities for forest recreation. The advantages of the SBE Method are the use of colour slides chosen objectively (randomly sampled), and the use of many slides to represent each topic under investigation. In this way the SBE Method counteracts the disadvantages of the Experimental Method. A disadvantage of the SBE Method is that it is a resource-demanding method.

In the SBE Method each respondent assessed 40 colour slides, half the number used in the national survey of the preferences of the population (and only winter slides were shown to the experts). Each of the four types of landscape - broadleaved forest, coniferous forest, the countryside and facilities for forest recreation - were then represented by 10 colour slides taken in winter. The places where the colour slides were taken were chosen objectively (randomly sampled) so the slides would represent the 4 types of landscape in Denmark at the time when the slides were taken (1977).

The colour slides were shown in random order on the screen, and the instruc-

tions for awarding of points (1 to 10 points) to the slides, were given in a text slide, which opened the show of slides. The rating criterion was: *"What do you think the visitors prefer ?"*.

The analyses of the data gained using the SBE Method were carried out by calculating the mean rating given to each of the four types of landscape by each respondent, and then comparing two types of landscape by analysing the respondents' differences between the mean rating of the two types of landscape. A detailed description of the method of analysing the data using the modified SBE Method is given in Koch & Jensen (1988) - and compared to the method proposed by Daniel & Boster (1976).

5) The response-rate for the investigations was between 85 and 100% (eight of the 19 collections had a response-rate of 100%).

Results

Results of the experts' perception of the forest and landscape preferences of the population are given for the following issues:

Nature in general,

The silvicultural system,

The choice of tree species,

Regeneration, formation and tending of stands,

Recreation facilities, and

Influences related to recreational use.

Nature in general

The countryside

On average the population prefers the forest to the countryside in wintertime. That result applies whether the countryside is compared with broadleaved forest, coniferous forest or forest with recration facilities. This is also the perception of the experts, cf. Table 1. Only two groups of experts do not have the perception that the population prefers the three types of forest to the countryside: the agriculture and forestry students, both of whom place the countryside ahead of forests with recreation facilities. Table 1 also shows that the landscape architects have the highest perception that the population prefers the forest to the countryside.

Grassland (in the forest)

This topic is investigated with slide pair no. 1 in Fig. 2. All three groups of experts believe that the general population prefers an old beech forest to grassland in the forest - which is actually not the case (Table 2, slide pair no.1). Especially the students (and in particular the landscape architecture and agriculture stu-

Table 1. *Comparisons between the mean difference of the preference ratings of the four types of landscape as assessed by the general population and perceived by various groups of experts. (The SBE Method).*

Segment	*n*	Mean Difference BROAD minus CONIF	BROAD minus CSIDE	BROAD minus FAC	CONIF minus CSIDE	CONIF minus FAC	FAC minus CSIDE
GENERAL POPULATION (from Koch & Jensen 1988)	95	0.33	1.49	0.43	1.16	0.10	1.06
TOTAL OF EXPERTS	344	1.32	2.11	0.78	0.80	-0.54	1.33
Expert							
Manager	237	1.33	2.22	0.53	0.89	-0.80	1.69
Student	107	1.29	1.87	1.33	0.58	0.04	0.54
Education							
Forest ranger	102	1.21	2.10	0.34	0.90	-0.87	1.76
Master of forestry	62	1.32	1.90	0.31	0.58	-1.01	1.59
Landscape architect	47	1.65	2.89	1.04	1.23	-0.62	1.85
Occupation							
Forest owner	14	0.99	2.09	0.39	1.10	-0.59	1.70
Employed by forest district	105	1.20	2.16	0.28	0.96	-0.92	1.88
Trained in forestry - not employed by forest district	44	1.28	1.76	0.35	0.48	-0.92	1.40
Landscape architect	36	1.53	2.95	0.92	1.42	-0.62	2.03
Nature conservation/planning	4	1.38	2.65	1.38	1.28	-0.00	1.28
Master study							
Forestry	33	1.41	1.28	1.46	-0.12	0.05	-0.17
Landscape architecture	36	1.57	2.01	1.22	0.44	-0.35	0.79
Agriculture (agronomy)	12	1.07	1.83	2.20	0.76	1.13	-0.38
Registered land surveyor	20	0.81	2.60	1.09	1.80	0.29	1.51

Note: BROAD = Broadleaved forest; CONIF = Coniferous forest; CSIDE = The Countryside; FAC = Forest with recreation Facilities. *n* = Number of respondents.

dents) are wrong in their perception of this topic. Three segments of the manager group have the correct perception of the preference of the population, viz. the masters of forestry, persons employed by a forest district and persons in nature conservation/planning.

Bog

A majority of the experts have the correct perception of whether the population prefers a naturally regrowing bog to a bog planted with ash (Fig. 2 & Table 2, slide pair no. 6). The assessment by all the different segments of the student group points in the right direction. Groups of managers where the majority are wrong, having the perception that the population prefer a bog planted with ash to a naturally regrowing one, are persons employed by a forest district and persons in nature conservation/planning. A large proportion of the experts trained in biology had the correct perception of the preferences of the population.

The silvicultural system

Number of tree species in the stand

Of the many subjects relevant to silviculture, only the number of tree species in the stand is under investigation here. The population prefers old beech forest with self-seeding regeneration to mixed species forest, consisting of trees such as: birch, beech, oak and Norway spruce - at different ages, cf. Fig. 2, slide pair no. 4. Table 2 shows that the experts in general judged correctly. A relatively large group of the managers educated in forestry and especially persons employed by a forest district, had the correct perception of the preferences of the population. The relatively large numbers in the "indifference group" perhaps indicate that the experts had some difficulty in assessing this topic. The students likely had the greatest difficulty, as they were almost equally divided between the two forest environments and indifference.

The choice of tree species

Broadleaved versus coniferous forest

All segments of the expert group have a very clear perception that the population prefers broadleaved forests to coniferous forests - which is true, cf. Table 1. (It should be remembered that it is mean assessments of broadleaved and coniferous forest which are compared - some of the SBE slides of coniferous forests are actually preferred to some of the slides of broadleaved forests by the population). - The landscape architects exhibit a strong supposition that the population prefers broadleaved to coniferous forests, cf. Table 1.

Beech versus Norway spruce forest

A topic which has been discussed for many years in Danish forestry is beech versus Norway spruce (Fig. 2, slide pair no. 2 & 3). According to the mean assessment of the population, old stands of beech rank higher in preference than old stands of Norway spruce in the summer, cf. slide pair no. 2 in Table 2. When the photos are taken in the wintertime there is no significant difference between the population's mean assessment of a stand of young beech and Norway spruce (slide pair no. 3). - And if the Norway spruce had a light cover of snow, then it would presumably have been ranked highest.

Referring to the summer photos of the old stands (pair no. 2) all the groups of experts agree that the population prefers the beech to Norway spruce. The students (the agriculture and forestry students in particular) are convinced that the beech is preferred.

Referring to the winter photos of the young stands (pair no. 3), the experts' perception points in the right direction: a much larger proportion indicate indifference to this pair of slides than to the one with old summer stands. But, a majority still believes that the population prefers young beech to young Norway spruce - especially the politicians. Only in three expert groups does a majority express indifference - namely masters of forestry, forestry students and persons in nature conservation/planning.

Table 2. *Comparisons between the mean assessment of the Danish population and the distribution in % of the experts' perception of population preferences regarding various forest management topics. (The Experimental Method).*

Slide pair no.	TOPIC (The topic preferred by the general population is the one printed in CAPITAL letters)	TOTAL OF EXPERTS	Segment of Experts			Segment of Managers								Segment of Students (Master Study)			
						Education				Occupation							
			Manager	Student	Politician	Forest ranger	Master of forestry	Landscape architect	Biologist	Forest owner	Employed by forest district	Trained in forestry - not employed by forest district	Nature conservation/planning	Forestry	Landscape architecture	Agriculture (agronomy)	Biology
1	GRASSLAND	36	43	24	20	43	53	42	45	27	55	38	46	35	19	15	26
	Old beech forest	54	45	67	60	45	37	46	55	64	27	53	39	56	73	83	57
	Indifference	11	12	9	20	13	10	12	0	9	18	9	15	8	8	2	17
2	Old Norway spruce (summer)	9	11	7	13	11	14	2	9	14	18	9	13	2	8	9	13
	OLD BEECH FOREST (summer)	72	68	81	53	59	67	78	73	59	58	62	74	89	73	87	61
	Indifference	19	22	13	33	30	19	20	18	27	24	29	13	9	19	4	26
3	Young Norway spruce (winter)	24	27	21	13	20	36	20	27	32	42	26	20	37	17	24	9
	Young beech forest (winter)	43	39	46	73	55	26	41	45	41	36	41	33	24	45	59	48
	INDIFFERENCE	33	34	33	13	25	37	39	27	27	21	33	46	39	38	17	43
4	Mixed species forest (selection system)	28	26	30	43	34	19	17	55	48	15	24	24	40	32	26	13
	OLD BEECH FOREST WITH SELF-SEEDING REGENERATION	40	43	36	36	43	50	41	18	48	73	45	37	29	30	37	43
	Indifference	32	31	35	21	23	31	41	27	5	12	30	39	31	38	37	43
5	BEECH FOREST WITHOUT BROKEN TREE TRUNK	32	30	36	20	23	33	44	18	27	48	24	30	49	36	30	30
	Beech forest with broken tree trunk	37	39	32	60	46	36	20	82	50	42	36	40	33	26	43	35
	Indifference	31	30	31	20	30	31	37	0	23	9	39	30	18	38	26	35
6	Bog planted with ash	35	38	30	33	43	41	34	27	41	55	44	46	33	31	30	0
	NATURALLY REGROWING BOG	48	48	47	53	45	47	44	73	41	39	45	43	49	50	39	60
	Indifference	18	15	23	13	13	12	22	0	18	6	11	11	18	19	30	40
7	Gnarled oaks	73	71	76	73	70	70	76	100	67	67	71	69	76	73	80	74
	Straight-stemmed oaks	17	16	17	20	18	19	15	0	24	21	18	19	18	19	13	17
	INDIFFERENCE	10	13	6	7	13	11	10	0	10	12	11	13	6	8	7	9
8	SELECTIVE THINNING IN NORWAY SPRUCE	69	69	68	80	68	71	66	91	68	76	71	72	76	63	61	70
	Thinning in rows in Norway spruce	9	9	11	7	5	8	2	0	14	3	8	6	8	15	9	9
	Indifference	22	22	21	13	27	21	32	9	18	21	21	22	16	23	30	22
9	Light thinning in Norway spruce	14	14	13	27	20	14	15	27	10	6	21	13	16	8	2	26
	VERY HEAVY THINNING IN NORWAY SPRUCE	53	49	60	47	46	46	56	45	57	61	41	48	51	71	63	57
	Indifference	33	37	27	27	34	41	29	27	33	33	38	39	33	21	35	17
10	BEECH FOREST WITHOUT LOGS AND BRANCHES	57	49	68	60	55	46	46	55	41	55	55	37	73	60	62	78
	Beech forest with logs and branches	12	13	10	13	4	18	15	27	5	24	11	17	8	19	2	4
	Indifference	31	38	22	27	41	36	39	18	55	21	35	46	18	21	36	17
11	FOREST WITHOUT EXERCISE STRUCTURE	36	39	34	27	36	52	29	36	27	67	48	31	59	29	22	17
	Forest with exercise structure	58	55	63	67	61	38	63	64	64	24	45	65	37	69	72	83
	Indifference	5	7	3	7	4	10	7	0	9	9	6	4	4	2	7	0
12	Forest road	17	16	19	0	5	25	8	0	27	45	14	13	41	15	13	9
	FOREST ROAD WITH BENCH	68	68	67	80	77	58	80	91	73	52	61	77	53	70	72	91
	Indifference	16	17	13	20	18	16	13	9	0	3	26	9	6	15	15	0
13	Forest road with horserider	13	9	20	7	14	6	12	27	5	3	8	11	24	17	20	22
	FOREST ROAD WITH FAMILY	61	65	55	60	54	70	68	55	59	88	58	65	59	47	50	70
	Indifference	26	27	25	33	32	24	20	18	36	9	35	24	16	36	30	9
Note:	Number of respondents	530	313	202	15	56	118	41	11	22	33	66	54	49	48	46	23

Regeneration, formation and tending of stands

Only a limited number of the many options related to the regeneration, formation and tending of stands were studied here. In general these issues do not have great saliency for the population. This does not mean that there are not distinct preferences for different alternatives.

Method of thinning

Two thinning methods were assessed, cf. slide pair no. 8 in Fig. 2 & Table 2. The experts' perception agrees with the preferences of the population - selective thinning ranks higher in preference than thinning in rows. Very few of the experts think the population prefers thinning in rows, between 0 and 15%.

Degree of thinning

The population prefers very heavy thinning to light thinning of Norway spruce. All expert groups share this perception of the populations' preferences, cf. Table 2 & Fig. 2, slide pair no. 9. A higher proportion of managers employed by a forest district, landscape architecture students and agriculture students have perceptions which agree with those of the population than do the other expert groups.

Logs and branches on the forest floor

Slide pair no. 10 in Fig. 2 illustrates well the lay-out of the Experimental Method: the left photo shows the same forest environment as the right photo but after removing logs and branches from the forest floor. According to the mean assessment of the population, preference is given to a beech forest without logs and branches on the forest floor. Only two groups of experts do not match the preferences of the population: the forest owners and persons in nature conservation/planning, who indicate indifference to the two alternatives. The students' perceptions - especially those of the forestry and biology students - agree most with population preferences (slide pair no. 10 in Table 2).

Dead trees

Slide pair no. 5 in Fig. 2 shows the same beech forest with and without a broken tree trunk: the latter photo was taken after cutting and logging the trunk. The population gave preference to the beech forest without the dead trunk. The experts differed greatly on this question, cf. Table 2, slide pair no. 5. Taking all experts together, there was a slight majority for the perception that the population prefers the beech forest with a broken tree trunk. But looking at the different segments in Table 2 it can be concluded that six segments have the forest with the dead tree as the one the population prefers - while three segments have the forest without the dead tree and three indicate indifference. The politicians, and even more so the biologists, have the misperception that the population prefers the forest with the dead tree (60 and 82%). (In this connection it should be noted that only 11 biologists answered the question).

Stem form

A significant difference was expected between the population's mean assessment of a gnarled oak stand and a straight-stemmed oak stand - in favour of the gnarled

Grassland

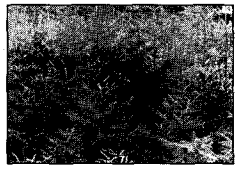
Slide pair no. 1

Old beech forest

Old Norway spruce (summer)

Slide pair no. 2

Old beech forest (summer)



Young Norway spruce (winter)

Slide pair no. 3

Young beech forest (winter)

Mixed species forest (selection system)

Slide pair no. 4

Old beech forest with self-seeding regeneration

Beech forest without broken tree trunk

Slide pair no. 5

Beech forest with broken tree trunk

Bog planted with ash

Slide pair no. 6

Naturally regrowing bog

Fig. 2. *The 13 pairs of slides used in the Experimental Method. (Bold-faced printing indicates which slide the population gave preference (level of significance = 0.05), no bold-face printing at a slide pair indicates indifference).*

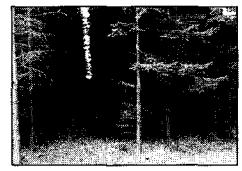
Gnarled oaks

Slide pair no. 7

Straight-stemmed oaks

Selective thinning in Norway spruce

Slide pair no. 8



Thinning in rows in Norway spruce

Light thinning in Norway spruce

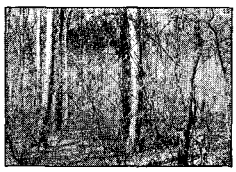
Slide pair no. 9

Very heavy thinning in Norway spruce

Beech forest without logs and branches

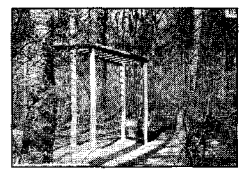
Slide pair no. 10

Beech forest with logs and branches



Forest without exercise structure

Slide pair no. 11



Forest with exercise structure

Forest road

Slide pair no. 12

Forest road with bench

Forest road with horserider

Slide pair no. 13

Forest road with family

stand (slide pair no. 7 in Fig. 2). But, no difference was found in the national survey. The experts also thought that preference was given to gnarled stands (Table 2). It was in the assessment of this topic (and the beech/Norway spruce issue) that the expert groups agreed most with one another. All the expert groups had the "wrong" perception - that there was a preference, varying between 67 and 100%, for the gnarled oak stand. The forest rangers and persons in nature conservation/planning indicated the greatest "indifference" to the issue - but still only by 13%. It was among the forest owners that the proportionally highest number thought that preference was given to the straightstemmed stand (24%). In particular, biologically-trained respondents and the agriculture students thought preference (as expected) was given to the gnarled stand (100 & 80%).

Recreation facilities

In the national survey of the preferences of the Danish population, many questions related to recreation facilities were investigated. This is partly due to the cost of these facilities to The National Forest and Nature Agency (Skov- og Naturstyrelsen) and private forest owners, and partly because the topics have a relatively high saliency for the population.

Recreation facilities in general

In general the population prefers a forest without recreation facilities - and is indifferent to whether or not the forest concerned is broadleaved or coniferous. Here the experts are mistaken. Only when the standard of reference is broadleaved forest do the experts have the right perception of the preferences of the population. In the case of coniferous forests, the experts are sure that the population prefers a forest with recreation facilities, cf. Table 1. The mean difference in the population (0.10) indicates some indifference between coniferous forests and forests with facilities. Only the students indicate a perception of this kind. As mentioned in the paragraph on the countryside, a forest with facilities is preferred to the countryside.

Exercise structure (path)

Slide pair no. 11 in Fig. 2 shows the same stand with and without an exercise structure. The population prefers a forest without any exercise structure. In general, the experts have the perception that the population wants a forest with an exercise structure. In Table 2 it is quite obvious that education greatly influences perceptions of the preferences of the population: the only experts with a perception which coincides with the preferences of the population are masters of forestry, forestry students, employees of a forest district and people trained in forestry - but not employed by a district. Students (apart from forestry students) and politicians give the relatively highest support to the perception that preference is given to the forest with the exercise structure. Very few of the experts indicated indifference as to whether a forest with or without an exercise structure (path) is preferred by the population. The highest percentage here was 10%.

Forest road with a bench

Slide pair no. 12, shows that the general population prefers the photo of the forest road with the discreet bench to the same road without it (Fig. 2 & Table 2). All the expert groups have the same distinct perception of the preference of the population, namely that preference is given to the forest with the bench. Two segments are slightly different from the others: employees of forest districts and forestry students rate the perception that the population prefers the "clean" forest road relatively higher than the other expert groups.

Influences related to recreational use

By influences related to recreational use we mean the influence of other forest visitors on the quality of a forest visit. Only one subject was investigated: the type of forest visitor.

Type of forest visitor

The same forest road as was used to assess the preference for a road with or without a bench was used to assess the preference for a family as opposed to a horserider, cf. Fig. 2, slide pair no. 13. According to the assessment of the general population, meeting a family ranks higher than meeting a horserider. All the different expert groups have the "right" perception - the quality of a forest visit is higher when meeting a family than when meeting a rider. In particular, relatively many experts employed by a forest district assess meeting the family higher than meeting the rider. Compared to the assessment of the bench, a relatively higher proportion of the experts indicated a perception of "indifference" when assessing the type of forest visitor, cf. Table 2.

Conclusions

This study of experts' perception of the forest and landscape preferences of the Danish population shows that there are more similarities than differences between the experts' perceptions and the preferences of the population. But, not all issues are assessed the same way: in about one third of the issues investigated, the experts' perceptions differ from the preferences of the population.

Where do they go wrong? The experts believe that the population prefers the more natural/unmanaged forest - for example, with a broken tree trunk and gnarled oaks. The reason for this bias in the experts' perception could be due to the influence of the more articulate nature conservation groups in society. There is no doubt that nature conservation groups have pressured forest management to preserve old and dead trees for the benefit of certain groups of fungi and fauna, and in general to take care of the remaining unmanaged forest. (It should be noted that some expert groups are aware of the preferences of the population on this topic - perhaps because of their better contact with the typical visitor). The experts also believe that a general development of recreation facilities in the forest has stronger support in the population than is actually the case. This misperception may stem from the professional attitude of managers,

which suggests that it is necessary to develop the primeval environment to preserve it from abuse by the public - and is perhaps also due to manifestations by certain interest groups and individuals.

It might be expected that the politicians, "standing aloof from the world", would be further than the other "experts" from a perception which agreed with the preferences of the population. But, actually a close resemblance is found. Only in three situations do the politicians deviate slightly from the other groups of experts - but not in a directly opposite way.

Among the experts there are differences, as already mentioned. For example, taking the politicians, managers and students together, there is a perception that the population prefers a forest with an exercise structure on a jogging path. Looking at the managers, we find that a majority of managers with a master degree in forestry and managers employed by a forest district have a perception which agrees with that of the population - for a forest without any exercise structure. Looking at the students, there are clear differences between the forestry and non-forestry students - where the forestry students also are more in tune with the preferences of the population.

In many instances it is stated that average considerations are dangerous to use in recreation planning and policy. If a manager tries to consider the "average visitor", only a few visitors are satisfied. The examples mentioned above indicate that in perception surveys too it is important to look at the perceptions of different groups (of experts) and not only use average considerations. The incisive statement by Shafer, "The Average Camper Who Doesn't Exist" (1969), might with justice also be used in connection with this perception survey, "The Average Expert (Manager-Student-Politician) Who Doesn't Exist".

Above it is speculated on why differences in perception of preference exist between experts and the general population. An additional discussion of some of the possible reasons for the differences can be found in Manning (1986, pp. 37-39). On the basis of Heberlein (1973) an interesting theory appears: an expert's oppinion of what the population *should* prefer may influence his or her view of what the general population *do* prefer.Furthermore, it is thought-provoking that the results reported in the present paper in many cases resemble and elaborate the results of Hendee & Harris, who published their article, "Foresters' Perception of Wilderness-User Attitudes and Preferences" back in 1970. Quoting Hendee & Harris:

"...since a large share of their work results from problem users, it would be strange indeed if their perception of typical users were free of bias.

...

A continuing challenge to wilderness and other resource managers is to learn about their clientele: who they are, where they come from, and how they feel about management policies." (1970).

In this way, the two authors indicate that a challenge for managers is to learn about their clientele: the visitors. The Danish results presented in this paper point in the same direction: to do a satisfactory job as a manager, it is important to devote some of one's time to the public opinion - starting during the study time at university. Emphasizing that you should not necessarily follow all preferences and wishes uncritical, as mentioned.

A problem is that the contact to the general population mostly is a contact between managers and what could be called "a professional general population". By this is meant representatives for the different interest groups in the society (e.g. nature conservation groups, hunting groups, scout groups, sport groups etc.). Very often it is this kind of "professionals" with whom the managers will get in contact - e.g. when debating proposals for new management plans for the national forests (where public involvement - by representatives for different interest groups - is compulsary).

A way to establish a closer contact between managers and the visitors might be to involve the managers in the different nature interpretation activities and nature school programmes to a larger extent than what is the case today. The results presented here indicate the importance of a broad contact with the population. - An experience which should not be reserved for the professional nature interpreters.

References

Daniel, Terry C. & Boster, Ron S. 1976: Measuring Landscape Esthetics: The Scenic Beauty Estimation Method. - U.S. For. Serv. Res. Pap. Rocky Mt. For. Range Exp. Sta., no. RM-167, 66 pp.

Heberlein, T.A. 1973: Social psychological assumptions of user attitude surveys: The case of the wilderness scale. - Journal of Leisure Research 5:18-33.

Hendee, John C. & Harris, Robert W. 1970: Foresters' Perception of Wilderness-User Attitudes and Preferences. - J. For. 68: 759-762.

Koch, N. Elers 1977: Skovenes friluftsfunktion. Præferencemåling. Metodeforslag. - Projekt Skov og Folk. Arbejdsnotat nr. 5. Statens forstlige Forsøgsvæsen, København, 63 pp.

Koch, Niels Elers & Jensen, Frank Søndergaard 1988: Skovenes friluftsfunktion i Danmark. IV. del. Befolkningens ønsker til skovenes og det åbne lands udformning. (Forest Recreation in Denmark. Part IV: The Preferences of the Population). - Forstl. Forsøgsv. Danm. 41: 243-516. (In Danish, summary in English).

Manning, Robert E. 1986: Studies in Outdoor Recreation: A review and Synthesis of the Social Science Literature in Outdoor Recreation. - Oregon State University Press, Convallis, OR, 166 pp.

Shafer, Elwood L., Jr. 1969: The Average Camper Who Doesn't Exist. - U.S. For. Serv. Res. Pap. Ntheast. For. Exp. Sta., no. NE-142, 27 pp.

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PAPER II

Forest recreation

Frank Søndergaard Jensen (1995)

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9 Forest recreation

Frank Søndergaard Jensen[1]

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Abstract

Comparisons between the Nordic countries show similarities as well as differences between the countries. In general, Norway, Sweden and Finland have the most in common in forest recreation. Denmark forms a link between central Europe and rest of Scandinavia, while Iceland takes up a special position. Comparable information is available on the following aspects of recreation: the relationship of forest recreation to other leisure activities, the number of visits to the forests, length of stay and transport time, time patterns, variations through the week, geographical use distribution within the forest, main activities, group size and means of transportation to the forest. Information on the importance of forests for recreation has been provided by studies on people's preferences concerning the quality of the environment, the facilities provided by management and the attitudes of recreationists towards other people in recreation areas. Nature schools give children education on nature and the environment in all the Nordic countries. Nature interpretation is considered to be an essential part of both recreation and tourism. The importance of urban forests and green spaces is increasing, because the amount of people living in towns is growing. Future research and management challenges include the problems connected with area competition and user fees.

Keywords: recreation, preferences, nature interpretation, nature schools, urban forests, research.

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9.1 Introduction

A detailed examination of the historical aspects of recreation in the Nordic countries is outside the scope of this text, so only an overview of the past is given, to get a feeling of the development of recreational behaviour. Recreation in northern Europe follows patterns found in many other Western societies, where the nature based recreational life of today can be traced back to the late 19th century (*Table 9.1*, *Figure 9.1*).

When talking about forest recreation of today, it is valuable to know the existing legal rights of access. In Norway, Sweden, Finland and Iceland the "Right of Public Access" ("Everyman's Right") is found. This right is a very old traditional privilege in these sparsely populated countries. It gives the right of access to private and public land for everybody, with some obligations implied. Within certain limits, visitors are allowed to move about freely. As long as they do not cause damage, they can walk or hike; ski; bicycle or go horse-riding; pick berries, flowers and mushrooms; go bathing and boating; and pitch a tent for a short period of time. The Right of Public Access was laid down as a written law in 1957 in Norway, and in 1960 in Iceland. In Sweden and Finland, it is called consuetudinary law, or a time–honored right.

In more than one way, Denmark forms a link between sparsely populated northern Europe and the more densely populated central Europe. This is evidenced also by the rules for public access.

Table 9.1 Rough outline of some of the trends in Nordic outdoor recreation during the last two centuries (partly based on Kardell 1979).

Year	Development in transportation	Movement in society	Recreation area	Groups of participants
1800				
	Railway system	Conservation org.	Beach/ archipelago	
		Tourism org.	Mountains	Expeditions
	Bicycles	Skiing clubs	Forests	Organized interest groups
	Public buslines	Scout groups		
		Rambling ass.		Families
	Private cars			
		Jogging movement		Special interest
		Equipment industry		
2000				

Figure 9.1 Outdoor recreation in the 1880s in Sweden (Nordiska museet, Stockholm).

It is believed that the Right of Public Access has been in force also in Denmark. Presumably, this was the case until an act in 1781 forbid the access of all unauthorized persons to the national (royal) forests. Legally, but not in practice, this situation prevailed, until the first Nature Conservation Act in 1917 re–established public access to national forests. A 1969 amendment to that act established a limited right of access to private forests. In the new Nature Protection Act, which came into force in 1992, these rights of access have just been enlarged and now include, among other things, the use of bicycles in private forests and access to the countryside.

9.2 Recreational use of the forest

The recreational use of the forest can be measured in various units: number of visitors, number of visits, or number of visitor/visit hours – and all these units can then be related to the size of the visited area (e.g. number of visits per hectare). However, it is important to keep in mind that the observable recreational use of forests is a result of people's choice between, for example, the known and available opportunities for forest recreation. In this way, the forestry sector itself also influences the amount of recreation. The potential

demand for forest recreation is very difficult to estimate, and will not be covered in this context; only the results of people's recreation choice will be described.

The following sections will try to cover a wide range of aspects of the observable use of the forest for recreation. Comparisons between the Nordic countries will be presented when possible. When making such comparisons, it is important to remember that the results derive from different survey methods and cover a relatively long period. (Koch (1984) gives the main characteristics of about 30 different surveys). Therefore, some of the mutual comparisons are relatively difficult and uncertain.

Forest recreation compared to other leisure activities

It is of interest to get an idea of how important forest recreation is compared to other leisure activities. The forest plays a very important role in the leisure pattern of the Nordic people (*Table 9.2*). In general, more than 80 % of the adult population visit the forest at least once every year. This is a rather high percentage compared to other leisure activities, such as movies, concerts, museums, etc.

Number of visits to the forests

Only Denmark has tried to estimate and describe the recreational use of the individual forest and the variation in use between *all* forest areas in Denmark

Table 9.2 Participation rates for different recreation/leisure activities in four Nordic countries.

	Norway[a] %	Sweden[b] %	Finland[c] %	Denmark[d] %
Forests/nature areas	91	82	85	91
Libraries	-	51	66	64
Art exhibitions	17	31	41	37
Museums (excl. art)	23	45	-	34
Theatres	22	33	45	13
Sport grounds	33	44	15	32
Concert halls	15	33	20	12

Sources: a) Friluftsliv -undersøkelse 1975, Tveit 1979.
b) Levnadsförhållanden 1987.
c) Ulkoilututkimus 1980, Vuolle et al.1986, Niemi et al. 1991, Sievänen 1993.
d) Koch 1978, Fridberg 1989.

The data covers a very wide time period, and the definitions of the different activities may vary between the countries.

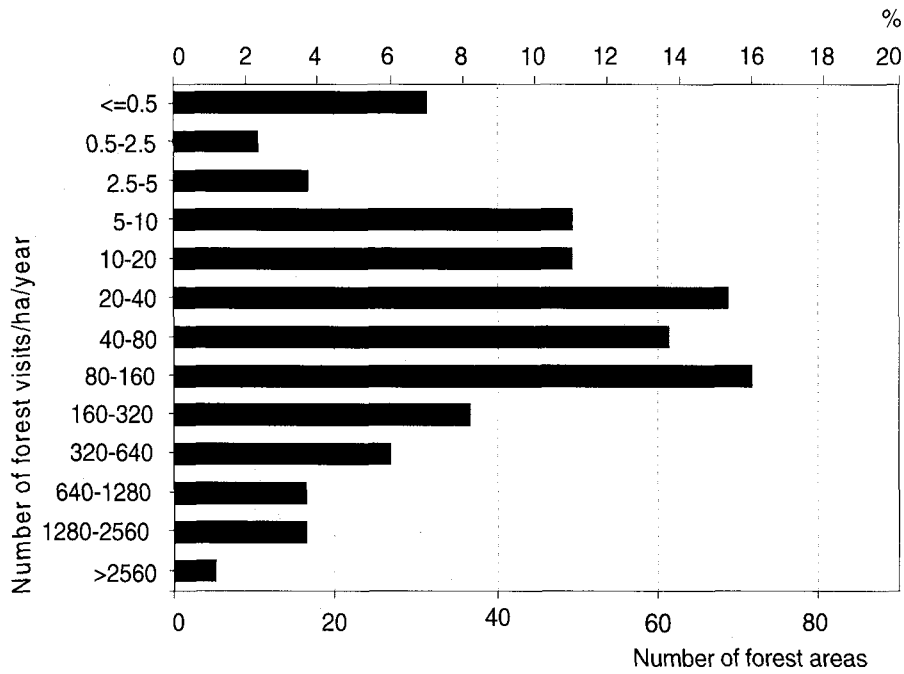

Figure 9.2 Classification of the Danish forest areas according to the yearly number of forest visits per hectare (Koch 1980).

(Koch 1980). The main result of these investigations is a classification of altogether 601 forests according to the intensity of recreational use (visits/ha/year). A description, based on questionnaires, is also given of how the different forests are used for recreation. *Figure 9.2* illustrates one of the important results of the investigations. It appears that there is a very large variation between the different forest areas in the yearly number of forest visits per hectare. In each of the 14 counties into which Denmark is divided, it can be found that some forests are used up to about one thousand times more intensively than other forests. The most intensively used forest in the investigation is used about twenty thousand times more than the least intensively used forests.

In contrast to the other countries, Denmark may be characterized by having a rather uniform geographical distribution of a relatively small forest area per inhabitant. Therefore, it must be expected that an even greater variation between forests in the intensity of recreational use would be found in the other Nordic countries. However, investigations carried out in the other countries have only dealt with rather few and relatively intensively used forests (*Table 9.3*). The most important reason for this is probably that in many areas it is difficult and costly to measure the amount of recreational use.

Table 9.3 Some measured use figures in selected investigations from Denmark, Norway, Sweden and Finland.

	Reference	Forest area	Number of visits per ha per year
Denmark	Koch 1984	Jægersborg Dyrehave	2021
		Store Dyrehave	96
		Åtte Bjerge	416
		Gl. Kjøgegaard	247
	Jensen 1992	Vestamager	235
Norway	Haakenstad 1975	Frognerseter/Sognvanns	223
		Ringkollen	23
Sweden	Kardell 1972	Bogesundslandet	34
	Heglebäck 1978	Nackareservatet	1500
		Järvafältet	300
		Lovön	100
Finland	Jaatinen 1973	Keskuspuisto	2200
		Luukkaa	315
	Pouta 1990	Luukkaa	260
		Salmi	60
		Tarusjärvi	20
	Sievänen 1992a	Aulanko	2000
		Ahvenisto	4000

Length of stay and transport time

Figure 9.3 shows comparisons of results from a Danish survey and results from a quite similar survey in Sweden. Based on this information, it may be concluded that the Swedes spend more time on each visit compared to the Danes, and spend less time on transport to the forest in general. These differences are in accordance with the distribution of the forest and living areas in Sweden compared to Denmark.

The length of stay is of course very dependent on, for example, what kind of forest we are talking about. This can be well illustrated by a Finnish survey, where Sievänen (1993) finds the average length of a visit to urban forests to be 1.5 hours, while the average for other forest types is 2.6 hours.

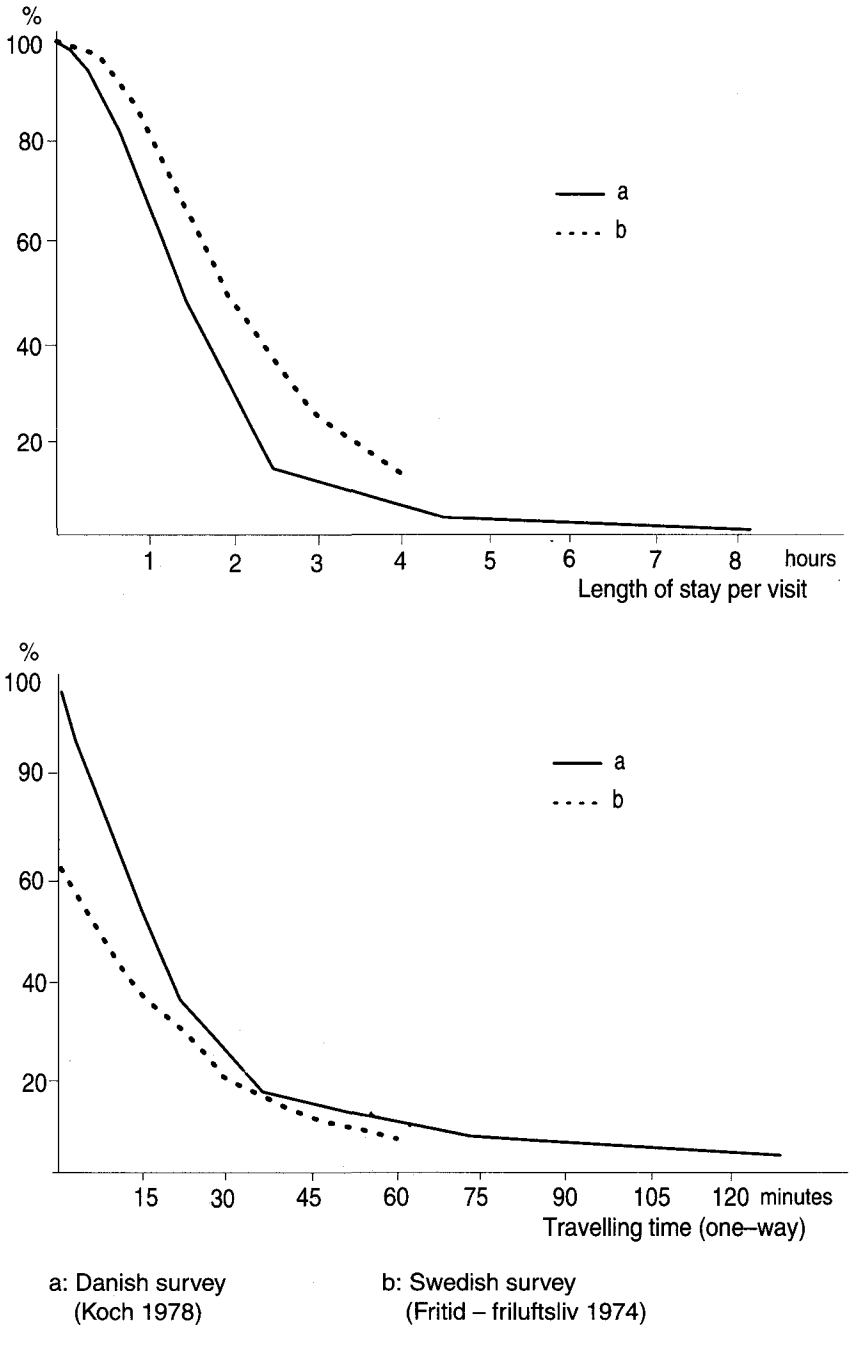

Figure 9.3 Comparisons of the cumulative distributions of two Nordic surveys according to length of stay and travelling time (Saastamoinen et al. 1984).

Time patterns

The Danish time patterns in forest recreation were studied in the 1980s (Koch 1984). It is quite natural that more visits are made at the weekends, and forests are more frequently visited in spring and summer than in autumn and winter. Very few visits occur in the late evening and night but there is a tendency to a small peak of visits around 7 o'clock in the morning (e.g. people jogging and walking the dog before the start of the working day).

This is a general Danish pattern, which will cover many situations, but of course there will be differences between the various forest areas – and the Nordic countries. Therefore, examples of differences and similarities in the visit variations through the week and the year are given in *Table 9.4*.

Variations through the week

In a Finnish survey by Saastamoinen (1979) and a Swedish survey by Kardell (1982) it is found that in areas very close to or within the city boundary, visits on Saturdays and Sundays account for a considerably smaller part of the total number of visits than in the Danish investigation. On the other hand, examples of areas in Norway and Sweden may be found where the number of visits during the weekend account for a larger part of the total number of visits than is the case in the Danish study (Haakenstad 1975, Kardell 1972).

Saastamoinen (1979) has contributed to an explanation of the tendency demonstrated in *Table 9.4*, that the number of visits per day is somewhat larger on Tuesdays and Wednesdays than on the rest of weekdays, because he finds that visits to a skiing trail in a forest in Rovaniemi by schools, companies, and other organizations are especially intensive on those days.

In northern Scandinavian forests, where the conditions are favourable for skiing, visit fluctuations through the year differ considerably from the results found in Denmark. February and March are among the most visited months, while May is among the least visited, and the range of variation is relatively large (Haakenstad 1975, Saastamoinen 1979, Saastamoinen & Sievänen 1981). It is evident that the length of the period with good snow for skiing influences the visit variations through the year in these areas, which is also demonstrated clearly by Saastamoinen and Sievänen (1981) as they investigated the variation through the year in forests partly in North Finland (around Rovaniemi), and partly in South Finland (around Kerava). This survey shows that it is possible to affect the variation through the year considerably; an illuminated cross–country skiing trail in the forest near Rovaniemi resulted in a visit variation through the year on Wednesday evenings almost similar to the variation through the year for Sundays at midday. The variation through the year on Wednesday evenings around Kerava, where there is *no* illuminated

trail, is completely different with close to zero visits during the period of November–January.

Most of the investigations compared have in common that visits are especially intensive in July and August (cf. *Table 9.4*). Presumably, a contributing factor is the tourist visits culminating in these months. In addition, May has a large number of forest visits as this month is a pronounced foliation month (Kardell 1982, Koch 1984). Concerning the berry picking in autumn, there is no doubt that for some areas this will be the most intensive season.

Geographical use distribution within the forest

Just to know the number of visits in a certain forest is not always sufficient information when planning and managing for recreation. It is of interest to know how the visitors are distributed within a single forest area. In Denmark, a technique has been used with success by Koch (1984) and Jensen (1992). *Figure 9.4* shows a result of the use of this technique: when making interviews in the particular forest area, the respondents have been asked to draw the route of their forest visit on a detailed map (practically all respondents found this little exercise very interesting and amusing – and not difficult). As shown in the figure, it is obvious that the eastern part of the forest is the most popular. It is close to the city nearby and the two major parking lots.

A considerable variation in the geographical use intensity within the single forest area is found in several surveys, for example, in Norway (Oslomarka) by Haakenstad (1975), in Sweden (Bogesundslandet and Linköping) by Kardell (1972 & 1982), and in Finland (Sievänen 1989). Kardell (1972) finds the largest geographical use distribution in autumn. This condition is explained by the fact that visitors are picking berries and mushrooms at this time of the year. This observation is probably valid for many forest areas in Norway and Finland as well, as in both countries it is a tradition to pick berries and mushrooms. This activity has just started to become popular among the Danes.

It is also important to know how many visitors stick to the forest road and trail system and how many do not. Two Danish surveys by Koch (1984) and Jensen (1992) show that approximately 15–20 % of the visitors are walking outside the roads and trails (more men than women and less single visitors).

A similar percentage is found in a survey from Iceland in a forest area near Akureyri (Blöndal 1991). In Sweden, Kardell (1982) found that 5 % did not stick to the forest road and trail system in two forest areas. In Norway, more younger people and more people during the summer are found walking outside the road and trail system (Haakenstad 1972). Finally, a Finnish survey from two areas close to Helsinki concludes that: "...the recreationists visit terrain without trails nearly every time they visit a recreation area" (Kellomäki 1977).

Reference	Unit of measurement	Area(s)	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
NORWAY																					
Haakenstad			1	1	2	2	3	59	100	7	41	61	100	45	28	46	46	74	51	48	7
1975	One visit	Frogneseter /	13	14	25	16	20	30	100												
		Sognsvann	2	2	3	3	4	53	100												
Haakenstad			4	10	10	10	14	62	100	53	56	91	99	93	49	87	100	94	67	62	37
1975	One visit by car	Ringkollen	43	63	51	55	79	100	60												
			5	10	9	10	30	91	100												
SWEDEN																					
			____	____	12	____	____	52	100	(___,___)			(___,___)			(___,___)			(___,___)		
Kardell			____	____	10	____	____	45	100	26			33			100			31		
1972	One car visitor hour	Bogesundslandet	____	____	4	____	____	31	100												
	and one visit		____	____	3	____	____	34	100												
			____	____	8	____	____	41	100												
Kardell	One visit	Lindköping S.	____	____	81	____	____	57	100	(___,___)			(___,___)			(___,___)			(___,___)		
1982										11			99			100			53		
FINLAND																					
Saastamoinen	One visit	Rovaniemi																			
1979		(skiing route)	65	73	71	51	48	76	100	30	78	100	47	27	4						16
Saastamoinen &	One visit	Rovaniemi	35	35	38	41	41	68	100	55	90	100	100	52	13	19	16	19	19	42	55
Sievänen 1981		Kerava	32	32	35	33	61	68	100	22	100	100	65	33	26	15	17	22	20	37	35
DENMARK																					
Koch	One car visit	Århus	57	59	59	58	56	75	100	28	25	31	44	63	85	93	100	78	53	46	36
1984		Store Dyrehave	33	35	31	29	28	61	100	100	19	16	20	25	38	30	23	32	29	24	22
		Århus	28	27	27	25	24	55	100	36	41	37	48	75	100	70	82	61	48	63	43
		Århus	38	39	38	35	33	64	100	14	17	21	28	53	96	83	100	71	38	33	20
		Åtte Bjerge	18	16	18	16	11	45	100	24	56	69	23	66	100	94	98	91	68	44	24

Note: a): Index 100 = The highest mean number of visits per day of the week.
b): Index 100 = The highest mean number of visits per day per month.

Table 9.4 Comparisons between selected Nordic investigations on the variation through the week[a] and the year[b] in the relative number of visits per day (table based on Koch 1984).

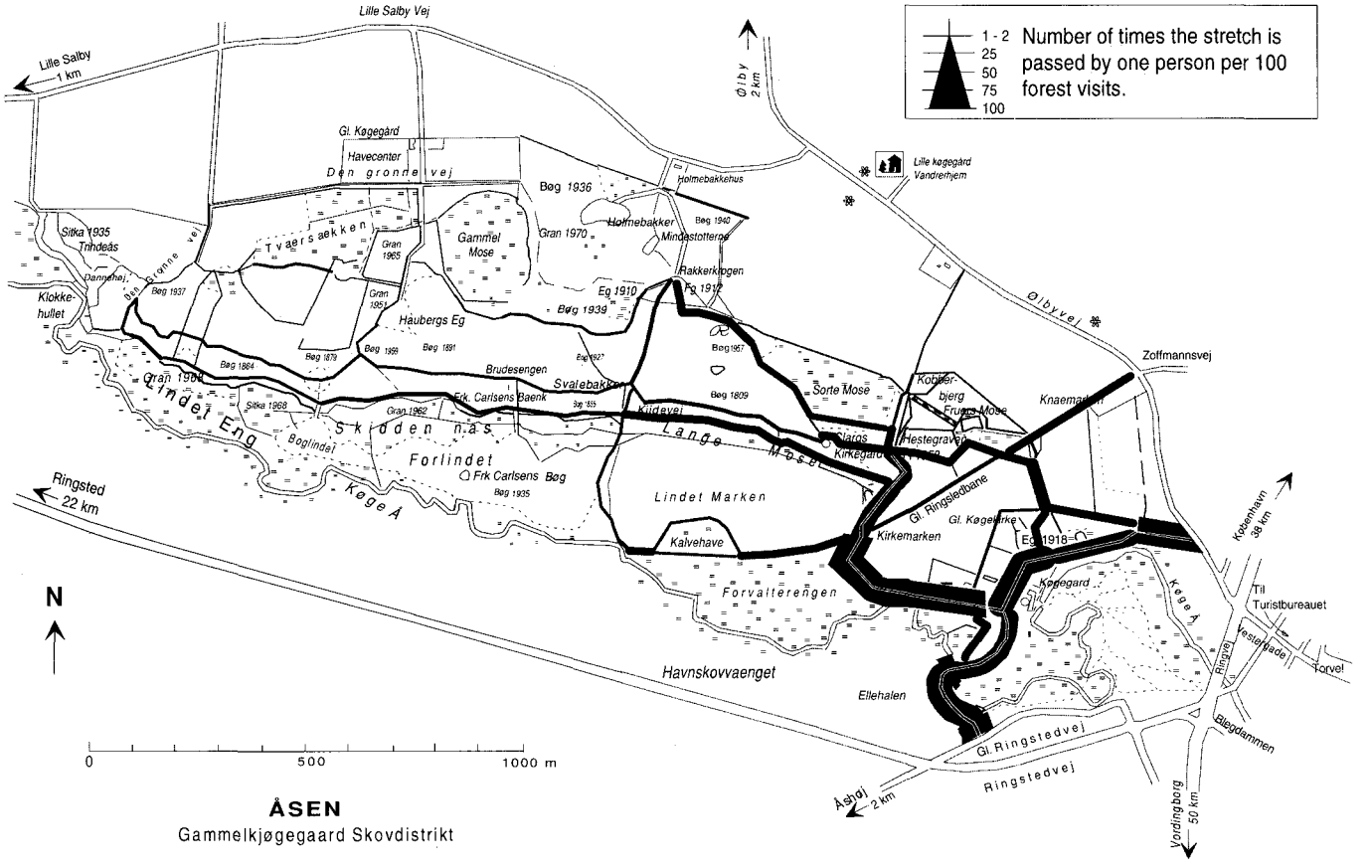

Figure 9.4 The geographical distribution of the recreational use of the Danish forest "Åsen" (Koch 1984).

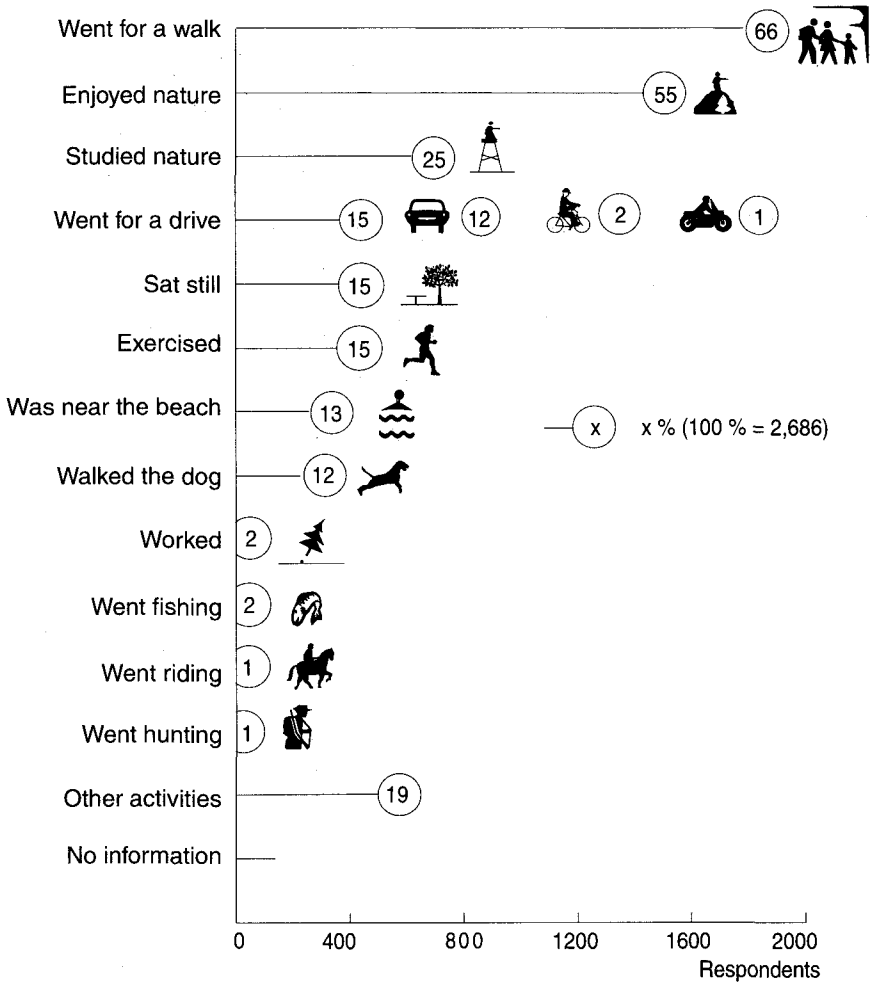

Figure 9.5 Distribution of the Danish forest visitors according to activities pursued during the latest visit to the forest (Koch 1978).

Main activities

What kind of activities do visitors pursue during their visits to the forests? This question is of great importance when managing for recreation in a multiple–use context.

Figure 9.5 shows the distribution of Danish forest visitors. It is interesting that walking, and enjoying and studying nature are the most frequent activities, while the more "consuming" activities like fishing, hunting and making (legal) use of products from the forest, for example, picking berries and mushrooms, collecting nuts, moss and lichen are the least frequent in Denmark (a total of less than 5 %).

When comparing activities in the Nordic countries, it is found that activities like walking, cycling and exercising in general are relatively popular in all countries. Activities where we really find differences are berry and mushroom picking: participation rates in Finland are more than 70 % (Ulkoilututkimus 1979), and in some specific areas in Norway and Sweden rates up to 50 % have been observed (Kardell & Pehrson 1978, Kardell & Holmer 1985, Aasetre 1993). These are rates far above what are seen in Denmark.

Denmark and the other Nordic countries are different also when it comes to winter activities like cross–country skiing. Mainly due to lack of snow, skiing is very seldom possible in Denmark, while in some areas in the other Nordic countries it is clearly the main activity during the winter time. For example, Saastamoinen and Sievänen (1981) conclude: "The recreational use of urban forests has a special importance during the skiing period in Finland". Undoubtedly, this conclusion applies to Norway and Sweden as well (as a point of interest, there is actually only a couple of illuminated cross–country skiing trail in Denmark!).

Group size and transportation to the forest

From *Table 9.5* it can be seen that the Danes walk alone in the forest a little less frequently than the Swedes, the Norwegians, and especially the Finns. Perhaps fear of the forest is greater in Denmark, a densely populated agricultural country, than in the other Nordic countries? The Finns seem to walk alone much more often than all the other Scandinavians (here it is important to be aware of the fact that the Finnish survey is restricted to urban forests).

The figures in *Table 9.6* also reflect some minor differences in recreational behaviour in the Nordic countries. In this case, in connection with the choice of the means of transportation to the forest, the number of visitors who walk to the forest seems to be largest in Norway, while the number of visitors using a car is largest in Denmark. Common to all the countries is the fact that less than 10 % use public transportation.

Table 9.5 Percentage share of the forest visits with a group size of one person. Results from four selected Nordic surveys.

Sweden: (Fritid–friluftsliv 1974)	16 %
Norway: (Friluftsliv –undersøkelse 1975)	18 %
Finland: (Sievänen 1992a) [a]	67 %
Denmark: (Koch 1978)	13 %

a) Urban forests

Table 9.6 Distribution according to the means of transportation used to get to the forest. Results from four Nordic surveys.

	Norway[a]	Sweden[b]	Finland[c]	Denmark[d]
On foot/ski	59	43	33	27
Horse	-	-	-	1
Bicycle	2	4	15	7
Moped, motorbike, scooter	1	0	-	2
Car	33	47	43	55
Bus, train	3	4	5	6
Other	2	0	3	0
Total	100	100	100	100

Sources: a) Friluftsliv –undersøkelse 1975.
b) Fritid – friluftsliv 1974.
c) Ulkoilututkimus 1979.
d) Koch 1978.

9.3 Preferences of the population

If an estimate of the importance of forests for outdoor recreation is wanted, a *quantitative* survey of how and how much forests are used for outdoor recreation is not sufficient. It is essential to try to form an estimate of the *quality* of outdoor recreation experiences, which leads to a study of wishes/preferences of the population and forest visitors as regards planning and management of the forest.

What kind of forest do the Nordic forest visitors prefer? This question will be covered in more detail in the chapters by *Christina Axelsson Lindgren* and *Minna Komulainen*. Here I will only discuss preferences in relation to environmental, management and recreational aspects.

Environmental aspects refer to the influences the landscape manager does not control (e.g. climate and noise from aeroplanes). In a Danish survey by Koch and Jensen (1988), these kind of influences have only been tested by one verbal stimulus: "silence". It is notable that this influence reaches the highest average estimate of all (100) verbal stimuli used. Haakenstad (1972) finds similar results in his survey in the Oslo region in Norway. However, the interpretation of this result is rather complex. It is hardly the physical silence alone which is so important. Supposedly, bird song, for example, is compatible with "silence"? Perhaps this result really reveals more about an important reason for forest visits than it would be possible to uncover by a number of more direct questions. But, presumably, the impression of the word "silence" varies from person to person, place to place, and from one time to another. (In addition,

Haakenstad found that the weather conditions had an influence on the decision for taking a forest walk.)

Management aspects refer to the influences the landscape manager can adjust directly. Here only *facilities for forest recreation* will be discussed. A general problem attached to the method of measuring preferences for facilities is that the estimate of these arrangements is often based more on an aesthetic criterion than on a functional one.

In Denmark, forest roads and paths are considered a relatively positive element in the forest environment, and it can be concluded that the less specialized and "unnatural" a path is, the higher preference it has with the public. The order of precedence of exercise path, riding path or cycling path, corresponds to the public assessment of meeting the three kinds of forest visitors – joggers, riders, and cyclists (Koch & Jensen 1988). Also, Hultman (1983) finds that forest roads and paths reach a relatively high assessment in Sweden. This is by far the case in countries where quite a few new forest roads are established in connection with large cuttings – and wilderness areas. Aasetre (1992) lists quite many surveys where the results indicate a rather mixed feeling for forest roads and paths among Norwegian forest visitors.

Recreational aspects refer to the other forest visitors' influence on the quality of a forest visit. Not surprisingly, it is found that the less other forest visitors a Danish forest visitor meets on his way, the higher quality is attributed to the forest visit in general (*Figure 9.6*). Similar results have been found in Norway (Haakenstad 1975).

According to Koch & Jensen (1988), the forest visitors can be divided into three popularity groups according to the opinion of the Danish population: (1) the most popular group consists of families, riders, and joggers, (2) the second group consists of cyclists and hunters, and (3) the least popular group consists of motorists and moped riders (*Figure 9.6*). In Norway, Haakenstad (1975) has also found a certain aversion to motoring in the forest. Not surprisingly, great differences are found in the preferences of different segments of the population, as, in general, there is most sympathy for the type of visitors to whom the individual feels most related to, and considerably less sympathy for the rest.

Concluding remarks

In the above, primarily *mean* estimates are referred to. However, in conclusion it is important to notice that if a landscape manager seeks to consider the interests of the "average" person only, he will only satisfy a *few* people; whereas a *varied* supply of opportunities that is in harmony with the surroundings and the *different* wishes of the visitors, can provide for the interests of a lot more people. In addition, surveys have shown that the managers' own preferences, or their perception of the preferences of the population, do not always correspond to the actual preferences of the population, for example, in connection with recreation facilities (Jensen 1990).

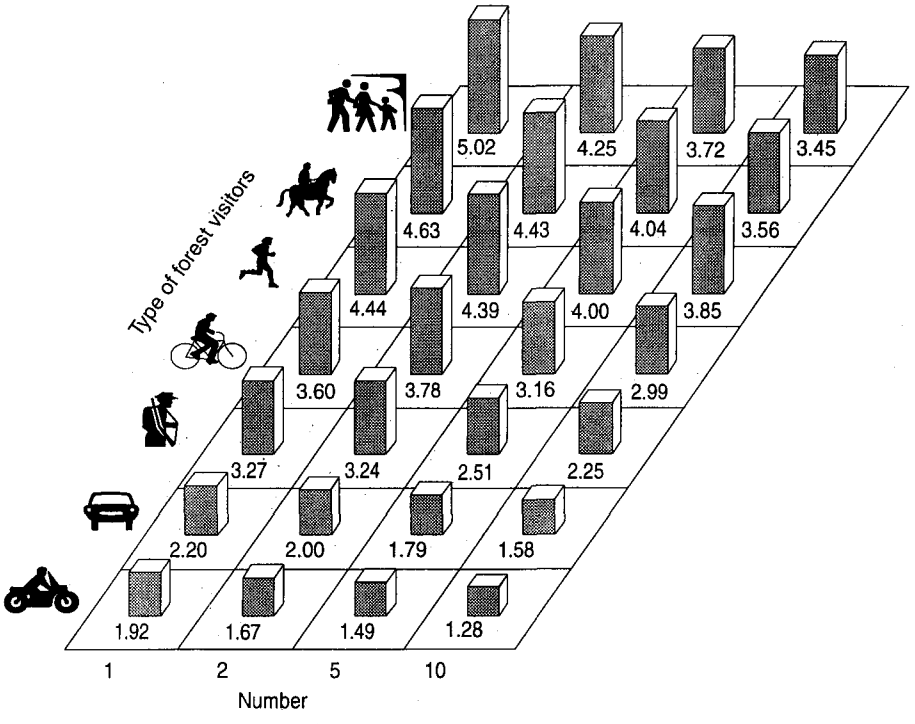

Figure 9.6 The Danish population's mean assessment of meeting various types of forest visitors, depending on their number (7: highest score, 1: lowest score) (Koch & Jensen 1988).

It is also interesting to make a note of a classification of the kind of comments Danish respondents in the survey by Koch and Jensen (1988) have put forward on the postal questionnaires. Of a total of 1,075 comments, *31 %* were related to recreation facilities including recreational use–related influences, while, for example, the silvicultural system plus the choice of tree species plus the tending of stands only got a total of *4 %* of the comments! This result indicates the need for detailed and comprehensive preference surveys. Insufficient knowledge of the different preferences of individual forest visitors might easily result in the landscape manager primarily seeking to comply with the wishes of the more articulated groups, which does not necessarily provide the best solutions. This is expressed by Gregory (1972) as landscape management in conformity with "the squeaking wheel principle".

Finally, Reunala (1984) points out that preference estimations can be useful for some purposes, but maybe their usefulness is more limited than generally believed. This might be due to forest experience being much wider than it appears, for example, it can include also symbolic values such as the forest as a mother symbol, and as an archetype.

9.4 Nature interpretation and nature schools

Before a description of the conditions in the individual Nordic countries (based on Naturvägledning... 1990), a short and more general discussion of the subject will be given.

In all Nordic countries nature interpretation is considered to be a very important part of both recreation and tourist policies. Furthermore, in many countries all over the world nature interpretation is considered to be one of the means of carrying out a modern nature protection policy. Such a policy does not only endeavour to protect strategic areas and formulate restrictions on those using nature, but also to increase understanding of conservation of the environment and species.

The Outdoor Life Project Group of the Nordic Council of Ministers has agreed on a common Nordic definition of nature interpretation (Naturvägledning... 1990):

"Nature interpretation is dissemination of feelings and knowledge about nature. Nature interpretation aims at increasing understanding of the basic ecological and cultural relations and of the part people play in nature. This way, the possibilities of positive experiences in nature and the possibilities of increasing concern for the environment of the individual and of society as a whole are improved".

The same project group has set up seven important subaims for nature interpretation. Nature interpretation can contribute to:

1) Encouraging simple outdoor recreation on the conditions of nature and in conformity with Nordic traditions.
2) Counteracting disturbances and damages to sensitive parts of nature.
3) Increasing the understanding of the necessity of different kinds of environmental and nature protection.
4) Contributing to a mutual understanding between landowners and the different groups of recreational forest visitors.
5) Increasing the understanding of how people use and influence nature seen in the perspective of cultural heritage.
6) Disseminating knowledge of how human activities influence the ecological system.
7) Encouraging development in harmony with nature and natural resources.

Denmark

Nature interpretation is not a new concept in Denmark. In the 1950s, nature interpretation was already included in information on nature, through signs, leaflets, exhibitions, guided trips, movies, etc. This work is still in progress. The National Forest and Nature Agency alone has produced about 100 leaf-

lets on walking tours. Some of these have been translated into English and German.

In the 1960s, the first Danish nature school was formed outside Copenhagen. Today, there are about 25 nature schools which are run by the National Forest and Nature Agency and the local municipalities together, and other 25 nature schools which are run by the municipalities alone. During a one day visit, the class follows a program devised by the principal of the nature school. The aim of the visit is to give the child an understanding of nature through direct experiences. The forestry organizations have also produced information materials. One example is the teaching material "Forests in Schools, Schools in Forests" (*Figure 9.7*).

Another important aspect is the establishment of "forest/nature kindergartens". These are defined as kindergartens where the children, all year round and without facilities, are out in a forest area all the day. The interest in this kind of day–care has increased dramatically in Denmark: in 1991, 66 "nature kindergartens" were registered and in 1993 the number is estimated to be 3–4 times higher. Normally it is the municipality which organizes this type of day–care in cooperation with the local forest administrations.

An analysis in the 1980s showed that non–governmental organizations (ornithologists, scouts, anglers, etc.) were doing comprehensive and valuable work for nature interpretation, but the different interests were not coordinated and the work was done by unpaid volunteers. Therefore, the Ministry of the

Figure 9.7 Children participating in the Danish program "Forest in Schools, Schools in Forests". Photo: O. Vorre.

Environment decided to arrange nature interpretation more formally on a national level. Nature interpretation met with a favourable reception from the Danish population. During 1987–88, more than 50,000 people had contact with nature interpreters and their activities.

Special training in nature interpretation does not exist in Denmark. People with quite different educations are used as nature interpreters, and the National Forest and Nature Agency has devised a compulsory further training programme for the nature interpreters. Until today (1993), about 120 persons have taken part in this education.

Norway

The Norwegian parliament has recently taken a number of initiatives to strengthen outdoor recreation, among other things through "education, instruction and information". In an account about national parks in Norway from the mid–80s, a more direct attempt to deliver information and interpretation in cooperation with the national park management is proposed.

Activities and interpretation of outdoor recreation have been taken care of by non–governmental organizations and the educational system. Tourist associations, hunting and fishing associations, orienteering, skiing, and scout organizations have all played a part in further stimulating developments.

In recent years, the educational system has become more active as regards outdoor recreation. One of its aims is that all pupils, at least once, participate in a "camp school". The forest authorities also contribute through the project "Learn with the Forest" to learning in the recreational areas near the school.

Several nature interpretation centres have been established in connection with nature protection projects (*Figure 9.8*). There are leaflets which provide information on nature reserves, other nature conservation areas, and attractive outdoor recreation areas. The latest hiking maps are a combination of a map and an information brochure, where nature conditions are also described. Many municipalities hand out maps of outdoor recreation areas and opportunities for activities; forest or "nature" trails have also been established over a number of years throughout the country. For further description of nature interpretation in Norway, see Vistad (1993).

Sweden

Within the Swedish compulsory school system, nature schools are established as an extension of education on the environment and nature. In this way, "the child's curiosity and love of adventure are stimulated through direct experiences". The first nature school was established in 1982. Today there are about 25 schools. In recent years, a variant has been established, the so called "nature and culture school". To some extent, the nature schools also offer

Figure 9.8 A nature interpretation centre in Jostedalsbreen National Park, Norway. Photo: R. Bierach.

their services to the adult part of the population in the form of guided walks, excursions, lectures, etc.

As mentioned earlier, the forest organizations in Denmark and Norway have prepared teaching material. Actually, Sweden is the pioneer country in Scandinavia through its programme "Learn with the forest".

The establishment of visitor centres spread over the country has been for the benefit of both outdoor recreation and tourism. These information centres have been established in connection with nature reserves and other places that have a great number of tourist visits. At present, about 25 centres are spread over the country.

Different kinds of nature trails are becoming more common. At a rough estimate, there are 200 established nature trails in the country. Several different ways of disseminating information are used. The most usual way is through signs, but also leaflets, audio–tapes and guides are used. Finally it is worth mentioning that Sweden has put a lot of effort in information about the Right of Public Access (*Figure 9.9*).

Finland

The utilization of national parks and other conservation areas is increasing in Finland. This has led to the establishment of visitor centres in some of these areas. The aim is to comply with increased interest from the public and tourism through raising the level of service.

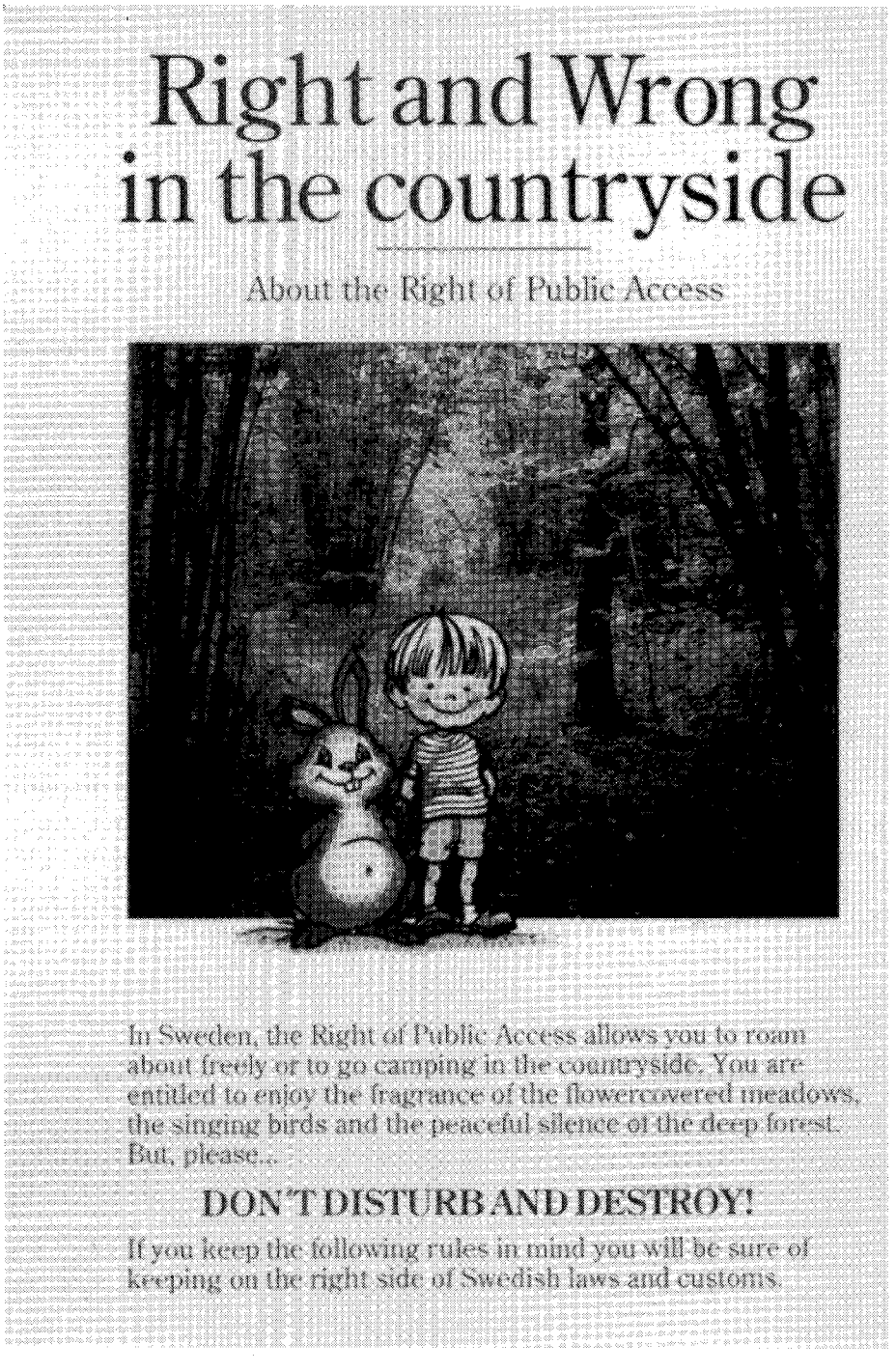

Figure 9.9 Swedish information leaflet on "the Right of Public Access".

Nature interpretation is also carried out at a local level. The bigger towns have for several years arranged free guided walking tours in the green open spaces. These tours are often guided by students and have a specific theme. Like in the rest of the Nordic countries, the non–governmental organizations arrange nature excursions, camps, etc. all over the country for children as well as adults.

Since 1969, mushroom consultants have been trained, and from the mid 1980s herb consultants have also been trained. The main objective at the courses has been to supply the students with sufficient knowledge to know and to distinguish the different mushrooms and herbs and to treat and prepare them correctly.

The first courses of "Wilderness guides" were carried out at the end of the 1970s. The main elements in the training have been wilderness skills, ecology, and customer–minded service. A certain interest in employing the trained wilderness guides can be found in the tourist associations and the hotel chains, and many of the trained wilderness guides have started their own businesses.

In addition, a lot of leaflets and maps are handed out or are on sale in order to promote nature interpretation and information about attractive outdoor recreation areas. Most of these exist in a Finnish as well as in a Swedish version. Some can also be found in English and German.

Iceland

With the increase in leisure time of the Icelanders, and the growing number of foreign tourists, the need for nature interpretation in Iceland has increased. As well as the other Nordic countries, Iceland has produced information about nature areas in the form of, for example, signs and leaflets. A relatively large part of the leaflets is translated into English, German, and French, and a part even into another Nordic language.

The Icelandic tourist association was founded in 1927. It offers various kinds of trips and walking tours. The guides working with the tourist groups are trained in nature, culture and language. This training was initiated in 1965.

In some national parks, daily nature interpretation is offered during the tourist season in the form of guided walking tours. Special interpretation for children has been carried out with great success. Guides are also found along hiking trails in the parks, where they concentrate on explaining about the vulnerability of nature.

In preparatory school, a part of the teaching is carried out in nature. It is considered to be very important that the teachers should have increased possibilities of taking the pupils outdoors in nature. In 1985, the first and till now only nature school was founded within the framework of a non–governmental organization. The school is situated near the capital Reykjavik. School classes can stay overnight but most classes come on one day visits. The teachers have

to arrange for instruction themselves as there is no "nature teacher" at the nature school.

Closing remarks

Common to all Nordic countries is the aim to educate children and young people through information about nature and environment. These countries also have in common that to a great extent they make use of special training of nature interpreters. It appears to be very impressive when the visitors meet qualified and well–trained people in nature; perhaps even more impressive than other media such as exhibitions, leaflets, movies, etc. However, these methods are very valuable, too. In all Nordic countries, a large number of leaflets and maps are published with information about attractive outdoor recreation areas.

As regards development in tourism, nature interpretation is of fundamental importance. It helps the tourists to enjoy their experience of nature and contributes to their knowledge of vulnerable ecosystems.

Basic and common to the Nordic countries is an increasing demand and need for nature interpretation. There are several reasons. One is improved knowledge of the necessity of a rich and varied environment. Another is the intense competition between, on the one hand, the landowners' interests, and on the other hand, the users of outdoor recreation opportunities. A third reason for an increasing need for information is the growing number of tourists from other countries who emphasize outdoor recreation. The methods used in the field of nature interpretation in the Nordic countries are more or less similar, and work with the concept has been intensified in all the countries since the 1980s.

9.5 Urban forests and green spaces

Recreation in – or close to – urban settings is a relative conception, which has different meanings according to the situation, and it is to some extent interpreted differently in the Nordic countries. The following short discussion, mainly based on two sources (Nærrekreation – friluftsliv... 1987, Naturvägledning... 1990), gives a general overview of the importance of recreation possibilities in an urban setting. A more detailed discussion of outdoor recreation in urban settings is given by, for example, Gåsdal (1993).

Great importance is attached to good possibilities of outdoor recreation in everyday life in all these countries. In this connection, it should be mentioned that the absolutely most important reason for the afforestation program in Iceland is to increase the outdoor recreation possibilities of the population in urban forest settings. In the ambitious Danish afforestation program (where the

objective is to double the Danish forest area during the next approximately 100 years) urban afforestation is also included as a very important element.

A trend is that increasing traffic, new traffic barriers, and expanding towns have increased the distance to "nature" and made access to the urban open spaces more difficult. In all Nordic countries, the municipality has the main responsibility for management of recreation interests in urban settings. Therefore, an important part of local planning is formed by physical planning and management – in which outdoor recreation possibilities have to be taken into account.

The groups with low mobility especially need good recreation areas in urban settings. Many senior citizens and walking–impaired citizens cannot choose their recreation area themselves. The same thing applies to certain handicapped groups (*Figure 9.10*).

Although many Nordic towns have relatively close contact with nature when seen in general perspective of the Western World, it is evident that a growing segment of Nordic people will live in towns with little contact with nature. This is unfortunate, not only because of the values of outdoor recreation, but also because a lack of experiences in nature in childhood *might* create an adult population without any (or with a feigned) interest in managing and preserving the natural resources of society.

Figure 9.10 It is important for handicapped groups to have the opportunity to enjoy recreation activities in nature. Photo: J. Holt.

9.6 Future

General perspectives in forest recreation

"It is difficult to foretell – especially about the future" a Danish jack–of–all–trades once said. This is very much to the point for the contents of this section. To give an estimate of future outdoor recreation applying to all Nordic countries will only be an informed guess.

Teigland (1990) expresses some ideas about outdoor recreation of the 1990s in Norway. Kaltenborn (1993) sets up some hypotheses on how changing society might influence outdoor recreation in the future. Based on my own and my two Norwegian colleagues' conceptions, the following section will try to look at some tendencies in the Nordic countries with the reservation in mind that there probably will be some differences in the trends in each individual country.

If we concentrate on the most popular and traditional sides of outdoor recreation like, for example, walking and bicycling in the forest, and on fishing and cross–country skiing, it appears that the level of activity has been rather constant during the last 20–25 years. However, it is not just a Nordic phenomenon that the *traditional* outdoor recreational habits have been rather steady. A survey from the USA has shown that only very few activities have changed in a dramatic way, even during a period of 20 years (Bevins & Wilcox 1980). Presumably, the reason for this is to be found in the fact that Nordic people as well as US citizens do not easily change their traditional hobbies, especially if they furthermore have invested a lot of time and money in developing skills and buying equipment. Such investments have taken place on a relatively large scale during the last couple of decades. However, the relatively steady outdoor recreation pattern does not exclude the occurrence of certain expected changes – and in some cases they are already in evidence:

- Increased unorganized outdoor recreation in forest/nature (e.g. the jogging/fitness movement, waterbased recreation and a greater interest/awareness of nature in general).
- Increased organized outdoor recreation in forest/nature (e.g. the scout movement).
- Increase in the types of sport that use forest as sports ground (e.g. orienteering).
- Increased risk of conflicts because of the specialized use of nature as recreative area (e.g. snowmobiling vs. cross–country skiing).
- A wish for "thrill–seeking" activities (e.g. mountainbikes, paintball/survival games).

And finally there seems to be trends towards:

- A wish for increased quality of leisure time as well as an increase in tourism.

If the above mentioned tendencies appear to be correct, these processes represent a big challenge for all people involved in forest recreation and forest management.

In this connection, it is interesting that according to foreign surveys, the norms and values that people are introduced to in childhood and youth form the basis for their future interests (Sofranko & Nolan 1972). In addition, a survey from 1991 (Recreation today... 1991) shows that a majority of Americans (59 %) began their favorite recreational activity in their childhood.

If these results apply to the Nordic countries too, the result *might* be a decline in recruiting to what could be referred to as more "traditional" Nordic forest recreation activities (such as walking in the forest, berry and mushroom picking and cross–country skiing). The earlier generations who were taught to appreciate these activities will be replaced by generations with a different or at least a more diversified basic attitude. Also, increasing urbanization might influence participation in the traditional "harvesting" –activities.

A demographic alteration which can be expected is the tendency to a higher level of education of the Nordic people. It is, of course, difficult to define what effects this will have on forest recreation, but it might lead to an increase in activities which at present are practised mainly by segments of the population with a relatively high level of education (e.g. wilderness backpacking and orienteering).

Finally, it could be discussed how probable changes in societies, like large (and permanent?) unemployment, a larger and more mobile and wealthy group of retired pensioners, relatively small youth cohorts, and a change in the ethnic composition of the Nordic population will influence trends in recreational patterns. As scientists, we probably just ought to realize that our knowledge of the facts and the alteration processes is not sufficient to form a basis for precise predictions about developments in the long term (*Figure 9.11*).

Area competition

When working with management of nature and environmental qualities and the resulting opportunities for experiences, it is important to distinguish between two main types of areas. One type is areas like national parks, conservation areas, and outdoor recreation areas which society has set aside for the sake of nature protection and/or recreational purposes. Even if the protection interests, through a considerable effort (and a presumable increase in support from the population), would be able to extend such areas in the years to come, they would hardly account for more than a very small percentage of the total area of the Nordic countries. In the rest of the area (maybe 90–95 %), outdoor recreation interests have to compete with other user interests – such as town, industrial and traffic extensions. In this respect, multiple–use planning will become of essential importance so that *all* interests are assessed in connection with the future development of an area.

Figure 9.11 What will the future bring in forest recreation? Photos: F. S. Jensen, O. Vorre, E. Oksanen.

As regards the areas which are set aside for nature protection and/or outdoor recreation, the main problem will be to maintain the various nature and environment qualities simultaneously with the improvement of facilities for different users. This is caused by a variety of wishes and demands from different user groups which cannot be met simultaneously everywhere.

Presumably, the future will show the necessity of increased user influence in the planning phase, just as there will be a demand for a clear overview of the types of experiences/qualities that are offered in a special area – whether it is qualities like solitude, unspoilt nature or improved recreation facilities and services.

To what extent a considerable improvement in facilities is wanted in connection with outdoor recreation cannot be described unambiguously. In the long term, it might prove more reasonable in terms of economy as well as ecology to teach visitors to use the nature areas in the most careful way and in a way that needs minimum improvement and maintenance of facilities. If such a strategy is chosen, the years to come will be a considerable challenge to governmental as well as non–governmental organizations to develop effective education and nature interpretation programs. Such programs should also include the increasing number of tourists from the more densely populated countries in Central Europe that are expected in northern Europe.

User fees

The tradition of relatively free access still prevails, but significant increases in user fees for some of the more capital–intensive opportunities have occurred since 1980 all over the Western World. These trends are likely to continue and be expanded to other opportunities in most countries.

It seems certain that the days of widespread relatively free publicly provided outdoor recreation opportunities are coming to an end in some countries, especially in Canada and the United States. In the Nordic countries, the practice of making land, especially state–owned land, readily available at low costs to the users, and the principle of Everyman's Right (Right of Public Access), have modulated use of many of the rationales for fees. These cultural traditions will probably persist in the near future and limit fee increases. The largest increases will probably be for activities requiring special capital investments, for example horse riding, fishing, etc. (Driver & Koch 1986).

What is happening in the United States?

It is not an unknown phenomenon that the trends seen in the U.S. sooner or later appear in one way or another in Europe. (In this context, comparative studies like the workshop proceedings on long–distance trails, edited by Sievänen (1992b), is of great value). In conclusion, it might be interesting

briefly to call attention to some of the U.S. trends related to forest recreation (Cordell 1992):

- The public is more concerned and informed than ever before about the environment.
- Traditional resource management priorities are being challenged.
- Agency priorities are tending towards amenities management.
- Congress is shifting budgets to fund amenities management.
- New partnerships and expectations are being forged.
- The public has greater awareness and more avenues for involvement and influence.
- Decision–making has become more complex and more scrutinized.
- Recreation management must be factually, not emotionally, based in order to compete with other resources and to meet intense scrutiny.
- Decline in available leisure time.
- Increasing immigration.
- Increasing number of "DINK's" (Dual Income No Kids).
- Increasing growth in metro areas.
- 1970s trend of rural growth reversed.
- Increasing growth of the non–white population.

And what does it all mean? It *might,* for example, mean:

- More urban people with less understanding of natural systems, but a growing interest in how the agencies and owners manage them.
- A greater diversity of people with less time and a growing demand for a diversity of high quality recreation opportunities.
- Greater place attachment and interest in learning and seeing (non–consumptive activities such as bird watching versus hunting; more fishing will change to catch and release).
- Management emphasis needs to focus on accommodations, appearance, information, education, and being in touch.
- A greater need for useful data in relation to outdoor recreation.

Perspectives in forest recreation research

The Nordic forest recreation research has been fluctuating from around 1970 until today. It seems that the individual countries have all had their "vigorous" periods as regards research within this field.

Sweden and Norway have been the pioneering countries, while it seems that Finland has had the most steady research over the years. The same relative steadiness is found in Denmark, but with considerably less resources available. In recent years, Norway has contributed positively by establishing an outdoor recreation research group as a subdivision of NINA (Norwegian Institute for Nature Research). This research group has published a competent monograph, describing outdoor recreation research in Norway (Kaltenborn &

Vorkinn 1993). In Iceland, it has not yet been possible to establish a research group for outdoor recreation.

Research in outdoor recreation in the Nordic countries up till now can be characterized by the need for descriptive studies (and mainly of the adult population). The following examples are a sample of future research topics given by Kaltenborn (1993), which more or less seems to fit all the Nordic countries:

- Repeated surveys to identify trends.
- Motives, attitudes and barriers.
- Obtained benefits, both individual and social.
- Effects of management interventions, such as nature interpretation.
- Retired pensioners and children seen in the perspective of outdoor recreation.
- The "close–to–home" outdoor recreational life.

Besides outlining some of the tasks for the future, the list above also clearly reveals the challenge involved in the discipline, *outdoor recreation research*, being situated somewhere between natural and social science.

As regards future research, the following items seem to be of essential importance in order to complete research of high quality in the relatively small research environments in the individual Nordic countries:

- Outdoor recreation research groups in the individual countries are secured a stable economic funding to enable *continuity* of the work.
- *Coordination* of research between the individual countries in order to secure optimal exploitation of the limited resources.
- *Liaison* projects are initiated to make use of larger external sources of knowledge and funding, like, for example, the European Union (EU).
- *Exchange* of scientists.
- Common research *seminars*.
- Construction of *interdisciplinary* research groups.

In conclusion, *cooperation* seems to be one of the keywords for future progress in Nordic outdoor recreation research.

References

Aasetre, J. 1992. Friluftsliv og skogbruk: en litteraturstudie. (Outdoor recreation and forestry: literature review.) Norsk institutt for naturforskning, Utredning 34. 52 pp. (In Norwegian.)

Aasetre, J. 1993. Friluftsliv i skog. (Outdoor recreation in forest.) In: Kaltenborn, B.P. & Vorkinn, M. (eds.). Vårt friluftsliv: aktiviteter, miljøkrav og forvaltningsbehov. (Our outdoor recreation: activities, environmental aspects and administration requirements.) Norsk institutt for naturforskning, Temahefte 3: 25–32. (In Norwegian.)

Bevins, M.I. & Wilcox, D.P. 1980. Outdoor recreation participation: analysis of national surveys, 1959–1978. University of Vermont, Vermont Agricultural Experimental Station Bulletin 686.

Blöndal, S. 1991. Forest recreation in Iceland. Unpublished. 19 pp.

Cordell, K. 1992. Keeping recreation management on top in an information age. Papers for the Utah State University Recreation Shortcourse. Southeastern Forest Experiment Station, Athens GA. Unpublished.

Driver, B.L. & Koch, N.E. 1986. Cross–cultural trends in user fees charged at national outdoor recreation areas. Proceedings from 18th IUFRO World Congress, Division 6, Ljubljana. p. 370–385.

Fridberg, T. 1989. Danskerne og kulturen: de 16–74 –åriges fritidsaktiviteter i 1987, sammenlignet med 1975 og 1964. (The Danes and culture: the leisure activities of the 16–74 year old people in 1987, compared to the situation in 1975 and 1964.) Socialforskningsinstituttet, Rapport 89:8. 181 pp. (In Danish.)

Friluftsliv –undersøkelse 1974. Summary: Outdoor life study 1994. 1975. Statistisk Sentralbyrå, Norges Offisielle Statistikk A 725. 133 pp.

Fritid – friluftsliv. En undersökning av vanor och önskemål hos den vuxna tätortsbefolkningen 1973. (Leisure time – outdoor recreation. A study of the habits and preferences of the adult population in urban areas in 1973.) 1974. Statens Naturvårdsverk 1974:20. (In Swedish.)

Gåsdal, O. 1993. Uteliv i byen. (Outdoor recreation in towns.) In: Kaltenborn, B.P. & Vorkinn, M. (eds.). Vårt friluftsliv: aktiviteter, miljøkrav og forvaltningsbehov. (Our outdoor recreation: Activities, environmental aspects and administration requirements.) Norsk institutt for naturforskning, Temahefte 3: 33–41. (In Norwegian.)

Gregory, G.R. 1972. Forest resource economics. The Ronald Press Company, New York. 548 pp.

Haakenstad, H. 1972. Skogbehandling i et utfartsområde: en opinionsundersøkelse om Oslomarka. Summary: Forest management in an area of outdoor life: an investigation of public opinion about Oslomarka. Meldinger fra Norges Landbrukshøgskole 51(16): 1–79.

Haakenstad, H. 1975. Skogskjøtsel i rekreasjonsområder: skog og friluftsliv i to modellområder i Oslomarka. Summary: Forestry in recreation areas: forest and outdoor recreation in two model areas in Oslomarka. Norges Landbrukshøgskole, Institutt for Skogskjøtsel, Ås. 174 pp.

Heglebäck, T. 1978. Rörligt friluftsliv i tre rekreationsområden i Stockholmstrakten: Nackareservatet, Järvafältet och Lovön. (Motion recreation in three recreation areas in Stockholm region: Nackareservatet, Järvafältet and Lovön.) Sveriges lantbruksuniversitet, Avdelningen för landskapsvård, Rapport 10. 84 pp. (In Swedish.)

Hultman, S.–G. 1983. Allmänhetens bedömning av skogsmiljöers lämplighet för friluftsliv. 2. En rikstäckande enkät. Summary: Public judgement of forest environments as recreation areas. 2. A national survey. Sveriges lantbruksuniversitet, Avdelningen för landskapsvård, Rapport 28. 91 pp.

Jaatinen, E. 1974. Recreational utilization of Helsinki's forests. Folia Forestalia 186. 35 pp.

Jensen, F.S. 1990. Landscape managers' and politicians' perception of the forest and landscape preferences of the population. Proceedings from XIX IUFRO World Congress, Division 6, Montreal. p. 61–72.

Jensen, F.S. 1992. Befolkningens anvendelse af Vestamager til friluftsliv, 1985–88. (The utilization of Vestamager for recreation, 1985–88.) Forskningscentret for Skov & Landskab, Lyngby. Unpublished. 138 pp. (In Danish.)

Kaltenborn, B.P. 1993. Hva så? – Noen utfordringer i forskningen på og forvaltningen av friluftsliv. (What then? – A few challenges to research on the administration of outdoor recreation.) In: Kaltenborn, B.P. & Vorkinn, M. (eds.). Vårt friluftsliv: aktiviteter, miljøkrav og forvaltningsbehov. (Our outdoor recreation: activities, environmental aspects and administration requirements.) Norsk institutt for naturforskning, Temahefte 3: 136–139. (In Norwegian.)

Kaltenborn, B.P. & Vorkinn, M. (eds.). 1993. Vårt friluftsliv: aktiviteter, miljøkrav og forvaltningsbehov. (Our outdoor recreation: activities, environmental aspects and administration requirements.) Norsk institutt for naturforskning, Temahefte 3. 141 pp. (In Norwegian.)

Kardell, L. 1972. Bogesundslandet som rekreationskälla: en studie av ett skogsområdes utnyttjande till rörligt friluftsliv. Summary: Bogesundslandet as a source of recreation: a study of the utilization of a forest area for motion recreation. Forskningsstiftelsen Skogsarbeten, Redogörelse 4. 40 pp.

Kardell, L. 1979. Farfars friluftsliv – om han hade något. (Grandfather's outdoor recreation – if he had any.) Sveriges Skogsvårdsförbunds Tidskrift 1: 6–21. (In Swedish.)

Kardell, L. 1982. Hur Linköpingsborna utnyttjar sina stadsnära skogar? (How the people of Linköping utilize the surrounding forests?) Sveriges lantbruksuniversitet, Avdelningen för landskapsvård, Rapport 23. 86 pp. (In Swedish.)

Kardell, L. & Holmer, M. 1985. Friluftslivets förändringar på Bogesundslandet 1969–1982. (The changes in outdoor recreation in Bogesundslandet, 1969–1982.) Sveriges lantbruksuniversitet, Avdelningen för landskapsvård, Rapport 33. 117 pp. (In Swedish.)

Kardell, L. & Pehrson, K. 1978. Stockholmarnas friluftsliv: vanor och önskemål. En enkät– och intervjustudie. Summary: Stockholmers outdoors: use of nature areas. A mail questionnaire and a home interview study. Sveriges lantbruksuniversitet, Avdelningen för landskapsvård, Rapport 13. 112 pp.

Kellomäki, S. 1977. Polut ulkoilun kanavoinnissa. Summary: Potential of trails in guiding recreational activity. Silva Fennica 11(4): 263–268.

Koch, N.E. 1978. Skovenes friluftsfunktion i Danmark. I del. Befolkningens anvendelse af landets skove. Summary: Forest recreation in Denmark. Part I: The use of the country's forests by the population. Det Forstlige Forsøgsvæsen i Danmark, vol. 35: 285–451.

Koch, N.E. 1980. Skovenes friluftsfunktion i Danmark. II del. Anvendelsen af skovene, regionalt betragtet. Summary: Forest recreation in Denmark. Part II: The use of forests considered regionally. Det Forstlige Forsøgsvæsen i Danmark, vol. 37: 73–383.

Koch, N.E. 1984. Skovenes friluftsfunktion i Danmark. III del. Anvendelsen af skovene, lokalt betragtet. Summary: Forest recreation in Denmark. Part III: The use of forests considered locally. Det Forstlige Forsøgsvæsen i Danmark, vol. 39: 121–362.

Koch, N.E. & Jensen, F.S. 1988. Skovenes friluftsfunktion i Danmark. IV del. Befolkningens ønsker til skovenes og det åbne lands udformning. Summary:

Forest recreation in Denmark. Part IV: Preferences of the population. Det Forstlige Forsøgsvæsen i Danmark, vol. 41: 243–516.

Levnadsförhållanden 1982–83: Fritid. (Living conditions 1982–83: Leisure time.) Sveriges officielle statistik, Statistiska centralbyrån, Rapport 56. (In Swedish.)

Mattsson, L. & Sødal, D.P. (eds.). 1989. Multiple use of forests: economics and policy. Proceedings of the Conference held in Oslo, Norway, May 1988. Scandinavian Forest Economics 30. 184 pp.

Nærrekreation: friluftsliv og fysisk planlægning i Norden. (Recreation close to urban areas: outdoor recreation and physical planning in the Nordic countries.) 1987. Nordisk ministerråd, Nord 1987:15/Miljørapport 1987:4. 164 pp. (In Danish.)

Nærrekreation. (Recreation close to urban areas.) 1990. Nordisk Ministerråd, København. 16 pp. (In Danish.)

Naturvägledning i Norden. (Nature interpretation in the Nordic countries.) 1990. Nordisk ministerråd, Nord 1990:52. 66 pp. (In Swedish.)

Niemi, I., Pääkkönen, H., Rajaniemi, V., Laaksonen, S. & Lauri, J. 1991. Vuotuinen ajankäyttö. Ajankäyttötutkimuksen 1987–88 taulukot. (Time use annually. The tables of the time use studies 1987–88.) (In Finnish.)

Pouta, E. 1990. Ulkoilualueen virkistyshyötyjen taloudellinen arviointi. (The economic valuation of the recreational benefits of a recreation area.) Pro gradu – tutkielma. Helsingin yliopisto, Kansantaloudellisen metsäekonomian laitos. (In Finnish.)

Recreation today: trends and statistics. 1991. Recreation Roundtable, Washington, D.C. Unpublished. 5 pp.

Reunala, A. 1984. Forest as symbolic environment. In: Saastamoinen, O., Hultman, S.–G., Koch, N.E. & Mattsson, L. (eds.). 1984. Multiple–use forestry in the Scandinavian countries. Communicationes Instituti Forestalis Fenniae 120: 81–85.

Saastamoinen, O. 1979. Valaistun hiihtoreitin käytön ajallinen vaihtelu. Summary: Time patterns in the use of an urban skiing route. Silva Fennica 13(1): 101–106.

Saastamoinen, O. & Sievänen, T. 1981. Keravan ja Rovaniemen lähimetsien ulkoilukäytön ajallinen vaihtelu. Summary: Time patterns of recreation in urban forests in two Finnish towns. Folia Forestalia 473. 24 pp.

Saastamoinen, O., Hultman, S.–G., Koch, N.E. & Mattsson, L. (eds.). 1984. Multiple–use forestry in the Scandinavian countries. Communicationes Instituti Forestalis Fenniae 120. 142 pp.

Sievänen, T. 1989. The trail inventory and forest recreation. In: Mattsson, L. & Sødal, D.P. (eds.). Multiple use of forests: economics and Policy. Proceedings of the Conference held in Oslo, Norway, May 1988. Scandinavian Forest Economics 30:89–105.

Sievänen, T. 1992a. Aulangon ja Ahveniston ulkoilualueiden käyttö ja kävijät. (The users and utilization of the recreation areas Aulanko and Ahvenisto.) Metsäntutkimuslaitoksen tiedonantoja 415. 70 pp. (In Finnish.)

Sievänen, T. (ed.). 1992b. Nordic Outdoor Recreation: international Comparative Studies. Proceedings of the Workshop held in Siuntio, Finland, 9–10.9.1992. Finnish Forest Research Institute, Research Papers 439. 144 pp.

Sievänen, T. 1993. Kaupunkiväestön ulkoilukäyttäytyminen ja ulkoilualueiden käyttö: Hämeenlinnan ulkoilututkimus. Summary: Outdoor recreation household survey in the city of Hämeenlinna. Folia Forestalia 824. 62 pp.

Sofranko, A.J. & Nolan, F.M. 1972. Early life experiences and adult sports participation. Journal of Leisure Research 4(1).

Teigland, J. 1990. Veivalg for norsk friluftsliv i 1990 –årene. Om nordmenns friluftsliv i 1970 og 1980 –årene, og perspektivene framover. (Choosing the way for Norwegian outdoor recreation in the 1990s. Norwegians' outdoor recreation in the 1970s and 1980s and future perpectives.) Lands–konferansen Friluftsliv, juni 1990, Bodø. Unpublished. 11 pp. (In Norwegian.)

Tveit, K.J. 1979. Fritid, kultur og kino. Arbeidsrapport fra en kinobruksundersøkelse i Stavanger. (Leisure, culture and movies. Working report of a study on the movies visiting activity in Stavanger.) Universitetet i Bergen, Geografisk Institutt. 56 pp. (In Norwegian.)

Ulkoilututkimus 1979. (Outdoor recreation study 1979.) 1980. Sisäasianministeriön ympäristönsuojeluosaston julkaisu C 1, n:o 5. 45 pp. (In Finnish.)

Vistad, O.I. 1993. Losing, læring eller sjekking? Om naturrettleing som forvaltningstiltak. (Guiding, teaching or checking? Nature interpretation as a management tool.) In: Kaltenborn, B.P. & Vorkinn, M. (eds.). Vårt friluftsliv: aktiviteter, miljøkrav og forvaltningsbehov. (Our outdoor recreation: activities, environmental aspects and administration requirements). Norsk institutt for naturforskning, Temahefte 3: 121–127. (In Norwegian.)

Vuolle, P., Telema, R. & Laakso, L. 1986. Näin suomalaiset liikkuvat. (This is the way how the Finns move.) Liikunnan ja kansanterveyden julkaisuja 50. Valtion painatuskeskus, Helsinki. (In Finnish.)

PAPER III

Forest recreation in Denmark from 1976 to 1994

Frank Søndergaard Jensen (1997)

Manuscript

Forest Recreation in Denmark from 1976 to 1994

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Abstract

Results based on two surveys of the recreational forest use of the adult Danish population are given. A postal questionnaire survey of 3087 individuals (response-percentage 91.4%) were carried out in the period from June 1976 to June 1977 on the basis of a representative sample of the adult Danish population (15-76 years old). This survey was repeated from November 1993 to November 1994 on another representative sample of 2916 adult individuals (response-percentage 83.7%). As main result it is found that the forest uses of the Danish population during the period from 1976 to 1994 have been relatively stable. Only minor changes has occurred, among these are: An increase in the number of visits to the forest; a decrease in the duration of the visit, transport time, transport distance and group size. Finally, it is ascertained that more forest visitors are walking or bicycling to the forest rather than driving by car in 1994 compared to 1976.

Keywords: Forest recreation; general population; questionnaire; trends; visitor use.

Introduction

The *background* of the investigations presented here is that the Danish political and administrative system is placing increasing emphasis on the importance of the forests and other natural areas for outdoor recreation, cf. e.g. "*Experiencing the State Forests. Outdoor life on the areas of the National Forest and Nature Agency*" (National Forest and Nature Agency, 1995) and "*Friluftsliv for alle*" ('*Outdoor Life for Everyone*') (Friluftsrådet, 1997).

The political system has announced that society is prepared to bear relatively high costs to cater for the population's need for outdoor activities. For example the National Forest and Nature Agency spent some DKK 80 million in 1995 in the area of outdoor recreation and nature interpretation/information (Skov- og Naturstyrelsen, 1996).

In this connection the state afforestation policy should also be mentioned - a policy which aim doubling the forest area from 12 to 25% of the total land area during the next 100 years. Consideration for the outdoor life of the population is often a very important parameter in the planning and establishment of the new forest areas (cf. e.g. Christensen, 1994; Fodgaard, 1995).

The research in Danish forest recreation started with the "*Forest and Folk*" project at the Danish Forest Experiment Station (now part of the Danish Forest and Landscape Research Institute) where extensive surveys of the population's forest recreation activities have been conducted. These surveys have been published in four parts: Parts I, II, III and IV of "*Forest Recreation in Denmark*" (Koch, 1978; Koch, 1980; Koch, 1984; Koch & Jensen, 1988).

It is now twenty years since the first data for these surveys of the population's use of and wishes for the forests were gathered. The *objects* of launching the "*Outdoor Life '95*" project in 1993 were (1) to *update* the only previous nationwide survey of recreational forest uses; (2) to analyze the *trends* between 1976 and 1994 in the population's use of the forests; and (3) the implementation of new nationwide surveys gives opportunities to study *new issues* related to the outdoor recreation activities of the population - issues that have become relevant in the intervening period after the surveys in the 70s.

In the "Forest and Folk" project methods have been developed for surveying the outdoor life of the Danish population. The surveys in the "Outdoor Life '95" project are based on these methods in order to keep the best possible basis for comparison between the two projects and thus to analyze the trends. - The question of using the same methodology is very clearly described by Smith (1994, p. 200): "When it comes to measurement variation and the study of opinion change, there are two lessons to be learned and followed: first, 'The way to measure change is not to change the measure.' And if this primary rule is *not* abided by, then second, 'It is a mistake not to learn from a mistake.'". Also Whiteman (1993) reach the same conclusion in direct connection with British household surveys of forest visitor numbers from 1987 to 1992: "By changing the design of the survey, it has been possible to examine features of

different survey designs in great detail, but it has also made interpreting the results of these surveys quite difficult".

The present paper does not give all the results of the "Outdoor Life '95" project. As mentioned above the project allows us to investigate issues that have not previously been analyzed. In this paper only the survey themes which are repeated from the previous survey will be presented. Thematically the content is close to that of Part I of the "Forest and Folk" project (Koch, 1978), and this permits direct analysis of the changes in the general population's use of the Danish forests for outdoor recreation. (The complete results of the project are published in Danish alone - the first part by Jensen & Koch (1997)).

Method

This section describes how the data on which this article is based were collected and analyzed. Data acquisition has been carried out in two national interview based surveys in 1976/77 and 1993/94 (henceforth referred to as 1976 and 1994), each involving some 3,000 people representing the adult Danish population. Contact was established by means of mailed questionnaires followed by up to three reminders. The mailing of the questionnaires was representatively distributed over a period of one year (Koch, 1978; Jensen & Koch, 1997).

Primary analytical unit of the survey

The use of the forests for outdoor activities can be calculated in terms of the number of *forest visitors*, the number of *forest visits* or the number of *forest visit hours* (Figure 1). When the *forest visitor* is taken as the analytical unit (count unit), the starting point is taken in the use of the forest by the *individual*. This is the case in the surveys reported here.

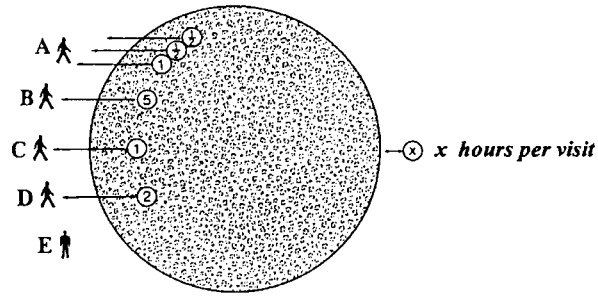

Figure 1. Illustration of the mensuration units: visitor (person-visit), visit and visitor-hour. In a population consisting of five individuals (**A, B, C, D** and **E**) 80% (4/5) of the individuals are forest *visitors* in a given period. In that period they make a total of six *visits* to the forests, adding up to 10 *visitor-hours* spent in the forest. **A** makes 50% (3/6) of the visits, **B** 17% (1/6) and **E** 0%. **A** is therefore the one who, in the given period has made most *frequent* visits to the forest. **B** however, with 50% (5/10) of the *visitor-hours*, is the one who has used the forest most *intensively* (Koch, 1978, p. 296).

Conversions among the various kinds of units will sometimes be possible. However, the uncertainty will depend on the unit selected as the primary analytical unit in the data collection process. Given the aims established for both the "Forest and Folk" project and the "Outdoor Life '95" project it is natural to choose the individual, the potential forest visitor, as take off.

Selection of interviewees

Since the aim of the surveys is to clarify developments in the population's use of the forests it is *the population* as a whole that forms the survey population. This was done by means of sample surveys, which require (1) the totality/population is well defined; (2) a suitable list of appropriate selection units; and (3) the selections made from this list are random. If these requirements are not met - as is frequently the case in connection with interview surveys - the results can objectively only be said to represent the people who have given the responses.

POPULATION AND SAMPLING TECHNIQUE

The Danish population is required to register births, marriages, deaths, changes of address, etc. This provides a very reliable sampling frame (the Civil Registration System, Ministry of the Interior) from which a systematic gross random sample consisting of respectively 3,087 and 2,916 persons has been drawn in 1976 and 1993, representing the adult Danish population, 15-76 years (Table 1).

ARE THE SAMPLES "REPRESENTATIVE"?

Although the interviewees were randomly selected from a suitable list of a well defined population, it would be justified to ask whether the sample "represents" the defined population. Therefore both samples are investigated to see whether they differ from the total population with respect to (1) age distribution for men, women and all; (2) age distribution within each county; (3) gender distribution; and (4) geographical distribution within counties according to men, women and all.

Table 1. The sample and response-percentages of the 1976- and 1994-survey.

	1976	1994
Gross random sample	3,087	2,916
Reduction of the population by death and emigration before contact	16	21
Net random sample	3,071	2,895
Number of non-respondents	264	471
Number of respondents	2,807	2,424
Response-percentage	91.4	83.7

No significant differences between the samples and the defined population have been identified. Therefore it can be concluded that the selected interviewees represent the resident population in Denmark (excluding Greenland and the Faroe Islands) aged 15-76 in 1976, respectively 1994 (Koch, 1978, pp. 360-364; Jensen & Koch, 1997, pp. 142f).

Distribution of interviews over one year

Several of the features that characterize a forest visit vary with the time of year. When results are wanted which can be generalized to the situation for a whole year, there are two options: either to get the interviewee to generalize over time or to ask the questions at representatively distributed intervals. The former solution is thought to reduce the validity (i.e. the external validity) of the results (Koch, 1977, p. 24 and 48; Koch & Jensen, 1988, pp. 262f).

In both surveys the interviews were therefore representatively distributed over one year. The selected net sample was systematically randomly divided into twelve portions (Koch, 1978, p. 360). Then questionnaires were sent out to one portion in each month in the respective periods 1st June 1976 to 31st May 1977, and 1st November 1993 to 31st October 1994. The mailing day in the month was selected randomly, but with the restriction that there should be at least two and at most six weeks between mailings (this restriction was adopted partly on practical reasons, partly to get a fairly even distribution over the year).

Collection of answers

Although the use of questionnaires is considered one of the most usable and fruitful data acquisition techniques in the social sciences - on condition that the technique is applied with reason - the disadvantages should not be neglected. Experience of this can be summarized with a quotation from an extensive study of the literature and methods, conducted for the U.S. Forest Service in the early seventies: "... the complexities of using questionnaires for research are often vastly underrated. The popularity of the method often rests on ignorance of associated problems of data analysis, bias, reliability, and validity of results." (Potter et al., 1972, p. 1).

The following initiatives were made to increase the response rate:

1) care in the formulation of the questionnaire-packet's physical appeal;
2) care in the design of the verbal prompting to respond;
3) stamped and addressed reply-envelope;
4) brief and simple questionnaire;
5) potential personal gain for respondents (lottery only in the 1976-survey);
6) the use of up to 3 reminders, mailed after 2, 3 and 5 weeks.

Sources of error

Errors of different types are associated with this type of surveys: (1) sampling error; (2) non-response error; (3) measurement error; and (4) errors due to coding, editing and tabulating.

SAMPLING ERROR

It is possible to calculate the error introduced by considering only a single sample out of a large number of possible samples. The absolute sampling error of the two surveys are better than ±2% of the frequencies found (95% confidence-limits).

NON-RESPONSE

The response rates of the two surveys are shown in Table 1. The relatively high response rates are probably due to a combination of various factors, including the subject of the surveys.

To determine whether or not non-response destroys the "representativity" of the samples, the distribution of all respondents over the most vital grouping factors has been compared to the distribution of the adult Danish population as described previously for the gross sample - no significant differences were discerned.

MEASUREMENT METHOD

The type of information may be an important source of systematic measuring errors, since the interviewees may consciously or unconsciously slant their responses (Koch, 1977, pp. 36f).

Information on the interviewees' *external status* - e.g. sex, age and the household's access to various goods - must be considered relatively accurate, since the interviewee will often be aware of the possibility of checks. In addition, much of this information comes from the Civil Registration System, which registers all the resident population and is considered to have very few errors.

The situation is different when it comes to information about *behavior*. In the surveys this applies in particular to the following subjects: number of visits, time of last forest visit, choice of forest area, activity, visit duration, transport time, type and distance, group size, and whether the respondent rides, hunts or exercise in the forest. In these cases there may be errors due to (1) difficulty in defining a given type of behavior in the questions; (2) memory failure of the interviewee or an urge to generalize and idealize (including to exaggerate or answer strategically); and (3) limited possibility of checks, of which the interviewee is assumed to be aware.

The risk of generalization in connection with the information on behavior is limited, since in most cases the information required is about *the last forest visit*. The demands on the memory of the interviewee are also small in these cases - since only about every fourth of these forest visits were made more than two month previously (Figure 2). The risks of idealization and misunderstanding cannot be dismissed. These sources of error have been discussed in more detail in connection with the analysis of the information on behavior during forest visits in the 1976-survey (Koch, 1978, pp. 308ff).

Measuring errors may further be due to the fact that others than the selected respondents answer the questionnaires. It can be established that this error occurs to a certain, although limited, extent.

It can generally be said of *measurement errors* that they are impossible to quantify objectively - only their direction and extent can be *estimated.* Minimizing measurement errors have been tried by exercising care in the construction of the questionnaire (pre-testing and evaluation by peers), and by avoiding as far as possible any direct influence on the data collection process - and using the same methodology in the two data collections.

DATA PROCESSING AND ANALYTICAL METHODS

Punch checks have contributed to the fact that it has only been possible to detect a very few punching errors. The processing and analysis of data was carried out with a well-reputed, proven statistical program package SAS (Statistical Analysis System), (SAS Institute Inc., 1982a; SAS Institute Inc., 1982b).

Results

Number of forest visitors and forest visits

INTERVAL SINCE LAST FOREST VISIT

For both 1976 and 1994, around 3/4 of the respondents had at the randomly chosen times been on a trip to the forest within the last two months (Figure 2). About half had been on a trip to the forest at least once during the fortnight before filling in the questionnaire, while 10% had been in the forest on the day they answered the questions. Finally, five per cent said in 1976 that it had been more than a year since they had last been on a trip to the forest, while the figure for 1994 was seven per cent.

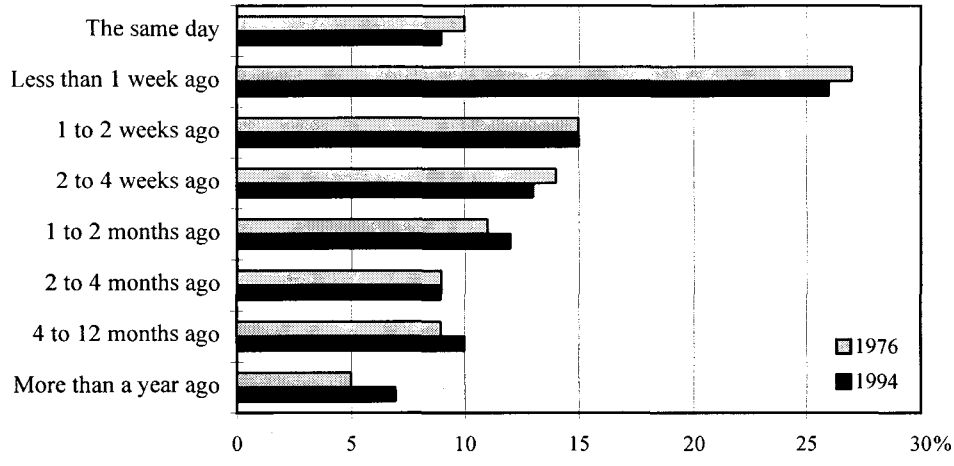

Figure 2. Distribution of respondents by interval since their last forest visit in 1976 (n=2698) and 1994 (n=2309) (estimated per visitor, χ^2=13.8, df=7, p=.054).

NUMBER OF FOREST VISITS PER YEAR

The time of the last visit to the forest can be used for ranking the respondents in groups in terms of frequency of visits. The people who had been on a trip to the woods the same day as they filled in the questionnaire must in general have visited the forest more times a year than those who had been in the forest less than one week ago. In both groups, however, it may happen that there are persons with very few, perhaps only one visit to the forest per year. To be able to calculate on this basis the average annual number of forest visits in each group, it is necessary to make some assumptions about the distribution of visit frequency in the population and over time. In Koch (1978, pp. 383ff) there is a more detailed account of a calculation model, developed by Professor Mats Rudemo, The Royal Veterinary and Agricultural University, for clarifying the problem.

During the work on the 1976 survey it became clear that, because of the inadequacy of the information procured, the calculation model would inevitably have to take off in questionable simplifications of reality. It was therefore decided that the problem would also be subjected to a special *follow-up study.* This involved a total of 436 persons, to whom a letter was sent in November 1977 with questions about their total number of forest visits (including short walks) over the previous year. By the end of the survey 90.3% had responded.

In combination with the main survey, the follow-up survey produced the following results for 1976: some 91% of the adult Danish population goes on a trip to the forest at least once a year. The *average* annual number of forest visits per individual, in the period from November 1976 until November 1977, was about 33, corresponding to a total figure for the population of about 125 million forest visits (Table 2).

Table 2. Key figures for the number of forest visits in 1976 and 1994 for the Danish general population between 15 and 76 years old[a].
A: *Percentage going to the forest at least once a year*
B: *Average annual number of forest visits per individual*[b]
C: *Total number of forest visits for the population (million visits)*[b]
D: *Median (value of midmost observation in the ranked material)*

Year	A	B[b]	C[b]	D	*n*
1976	**91**	**33**	**(125)**	**11**	3,071
1994	**91**	**38**	**(155)**	**10**	2,895

Note. a): It should be noted that the survey methodology was not completely identical in 1976 and 1994. The 1976 survey was conducted by double sampling (main survey and sample of this for a follow-up survey on the matter of annual forest visits (cf. Koch, 1978, pp. 311f and 385 ff)). In the 1994 survey there was also a follow-up survey to clarify the non-respondent issue (cf. Jensen & Koch, 1997, pp. 149ff).
b): Cf. the text for a discussion of the *exaggeration factor*, which is estimated to be about *3*. This means that the *total number of forest visits* i 1994 by the adult population is estimated at about *50 million.*

As for the 1994 survey, it has been established that in 1994 too, some 91% of the adult Danish population went on a trip to the forest at least once a year (Table 2). This means that the forests attract a considerably larger percentage of the adult population than the libraries, cinemas, art exhibitions, museums, theaters and concert halls (Figure 3). - This was also the case in 1976.

The *average* annual number of forest visits per individual in 1994 is estimated as about 38, corresponding to a total figure for the population of about 155 million forest visits (Table 2). This corresponds to a rise between 1976 and 1994 of just about 25% in the number of visits to the Danish forests by people between 15 and 76 years old. If the growth (about 300,000) in the population studied in the 18-year period between the two surveys is considered, the real rise in the number of visits can be estimated at about 15%.

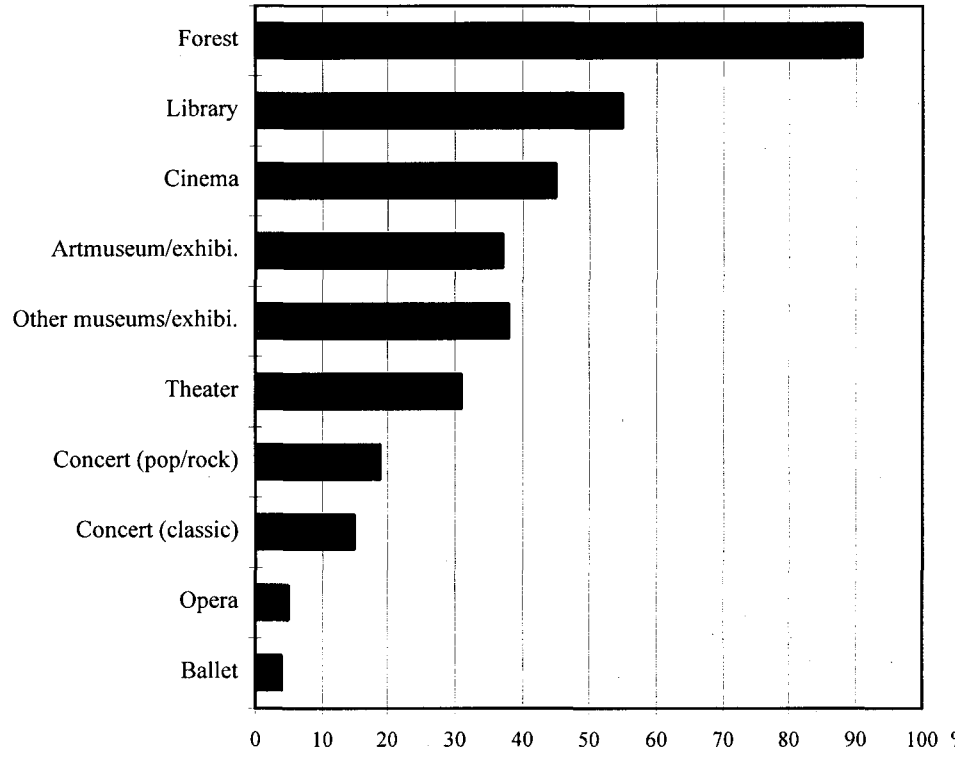

Figure 3. Attraction of various leisure activities. The percentage of the adult Danish population who have taken advantage of the listed leisure options at least once a year.

Note. The forest information was collected by the "Outdoor Life '95" project in 1993/94 (n=2895). Other data were collected by the National Statistical Office of Denmark in 1991 by telephone interviews. 1800 Danes over the age of 16 were randomly selected for the survey. The response percentage was 61 (cf. Ahlin, 1993).

The distribution of the number of forest visits per year is, as one often finds in the social sciences, decidedly "right-biased" (cf. e.g. Jeppesen, 1974, pp. 23f). In the 1976 survey it was established that just under a quarter of the population went at most four times a year to the forest (1994: just above a quarter); while another quarter is on average in the forest at least once every second week (1994: just under a third). About 10% are on average on forest visits at least once a week (1994: c. 15%), while slightly over one per cent (in both 1976 and 1994) go to the forest more than 365 times a year. The group with more than 365 visits a year nevertheless accounts for about a fifth of the total number of forest visits (Koch 1978, p. 312). The *average* annual number of forest visits per individual will thus be particularly dependent on the few, frequent forest visitors and therefore - in the distribution studied here - cannot be taken as an indication of "ordinary" behavior. But the *median* can.

The median is defined as the value of the midmost observation in a ranked body of material - the 50% fractile. (For a more detailed discussion of the properties of the central tendencies, the average and the median, reference may be made to e.g. Blalock (1972, p. 68ff)). For the 1976 survey this value can be identified as 11 trips to the forest a year, which is in other words the number of forest visits the "ordinary" adult Dane made in 1976 (Table 2). The 1994 survey gives the result that the "ordinary" adult Dane took 10 trips to the forest a year in 1994.

The rise in the average number of visits can thus be attributed to an increased number of frequent forest visitors, and as mentioned above this has a relatively strong effect on the *average figure* (Figure 4). That the median figure at the same time drops from 11 to 10 visits is due to the fact that a proportionally larger percentage of the population at the same time went a few times to the forest in 1994 compared with 1976.

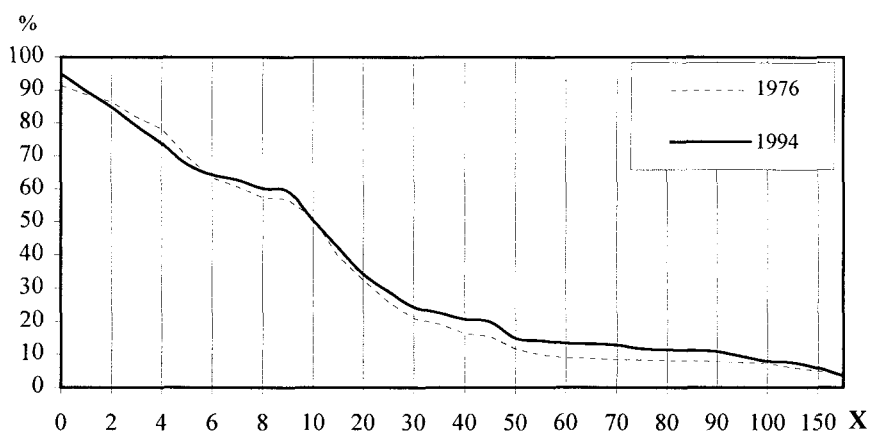

Figure 4. The percentage of the respondents who visited the forest more than "**X**" times a year. Comparison between 1976 (n=393) and 1994 (n=2192) (estimated per visitor).

For a more detailed discussion of *the uncertainty* involved in counting the number of forest visits this way, reference may be made to Koch (1978, pp. 308-313 and 390-391), where in particular the risk of *idealization/exaggeration* is emphasized. In Part II of the "Forest and Folk" project Koch has established that the exaggeration factor can be of the order of about 2 (1980, pp. 182-184). Kardell & Pehrson (1978, pp. 5 and 90f) found, in connection with similar analyses, that the respondents in a questionnaire-interview survey among Stockholmers had overestimated their annual number of forest visits by a factor of the order 5 - 10. In later Swedish studies of outdoor activities in Umeå and Växjö the exaggeration factor in connection with information on the number of forest visits was estimated as being between 2 and 4 (depending on, among other things, the formulation of the questions) (Lindhagen, 1996a; Lindhagen, 1996b).

Against the background of the studies cited it is *estimated* that *the respondents exaggerate by a factor of about 3 when answering the question about the annual number of forest visits.* This means that *the total number of annual forest visits in 1994 by the adult Danish population is estimated at about 50 million.*

The estimation of the exaggeration factor in the above-mentioned Swedish studies and by Koch (1980) is based on comparisons between counts in the forest and information from respondents to the question about the number of forest visits/last forest visit in connection with questionnaire surveys. In this way, it can be concluded that when one uses a questionnaire survey of the number of forest visits a year, there is a high risk of idealization/exaggeration.This is however the most common and inexpensive way of getting an impression of the extent of a given activity and can therefore be valuable for purposes of comparison (e.g. over time); but the absolute figures must be assessed with great caution.

The combination of several methods, for example direct observation/counts in forest and nature areas *and* questionnaire-interviewing, provides a basis for validity tests. As was the case with the "Forest and Folk" project, the "Outdoor Life '95" project will also be followed up by *direct measurements* of the use by the population of approximately 450 forest and nature areas - called the "*Outdoor Life '98*" project - which make it possible to work further with the issue of exaggeration/idealization in connection with the estimation of the annual number of forest visits.

GEOGRAPHICAL DIFFERENCES IN THE NUMBER OF FOREST VISITS

Geographical differences in the frequency of visits are identified. For 1976 it could be established that people living in the Metropolitan area (Copenhagen) in general went less frequently to the forest than people living in West Jutland, who in turn went less frequently than the population in the rest of the country. It was especially in the Roskilde county area and in the Copenhagen/Frederiksberg county area that the *average* annual number of forest visits per individual was low, while the opposite was true in the Storstrøm, Frederiksborg, Vejle, Århus and Viborg counties. In 1994 the same tendencies are found, i.e. that the frequency of visits is lower in the Copenhagen area than in the other regions of the country (Figure 5). In addition, a tendency towards an increasing number of for-

est visits in the Frederiksborg, Funen, North Jutland and Århus counties in particular are identified, while there is a trend towards a decreasing number of forest visits for the population in the Copenhagen area - especially in the Copenhagen municipality.

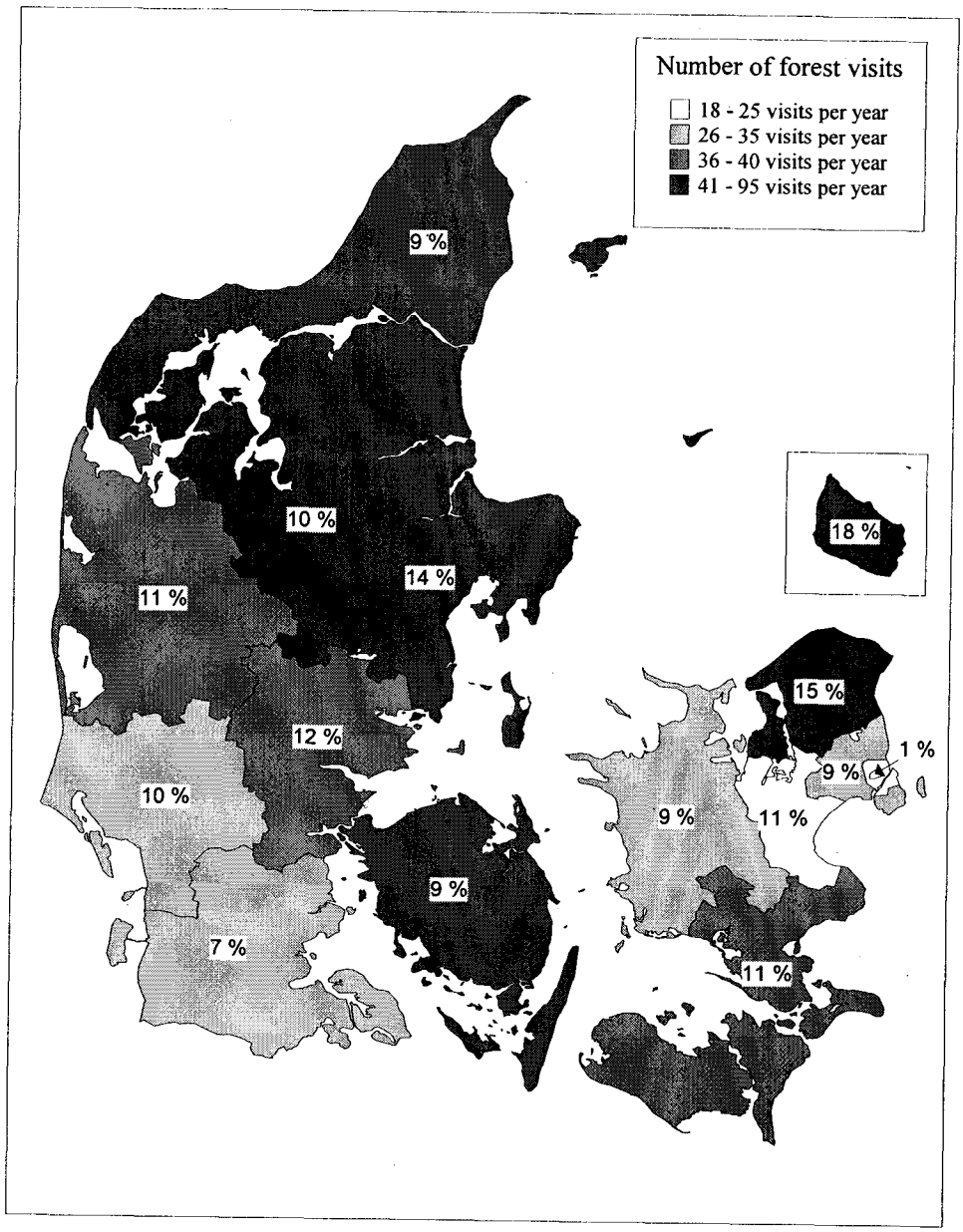

Figure 5. The respondents' average annual number of forest visits in the various counties in 1994 (n=2407) (estimated per visitor). (The percentage figures given indicate the forest area in the counties as a percentage of total county area (Danmarks Statistik, 1994, pp. 19 and 40)).

FOREST VISITS IN CONNECTION WITH HOLIDAYS

About 12% of the respondents stated that they were on holiday at the time of their last forest visit in 1976, as against 13% in 1994, and 7% were staying in summer/leisure cottages and the like in 1976 as against 6% in 1994 - in other words no real changes in these distributions between the two surveys.

Duration of the forest visits

In 1976 just under 50% of the forest visitors spent an hour or less in the forest in connection with their last forest visit; in 1994 the figure was almost 60%. Four per cent spent more than about five hours, while another four per cent spent less than quarter of an hour in the forest in 1976. In 1994 there was a rise to 6% in the group that spent less than quarter of an hour. Both in 1976 and 1994, a forest trip of one to two hours was the *most frequent* activity. On the basis of the interval-midpoints in the classification of the duration of visits it can be estimated that the *average* visit duration was 1.9 hours, with a *median* value of 1.6 hours in 1976. These figures had dropped in 1994 to 1.8 and 1.1 hours respectively (Table 3 and Figure 6). In the period 1976-1994 there was thus a significant change towards shorter forest visits.

Table 3. The average duration (in hours) of the last forest visit in 1976 and 1994 (estimated per visitor).

Year	Mean $\bar{x}$	Median	SD s	n	t	p
1976	**1.9**	**1.6**	1.67	2,671		
1994	**1.8**	**1.1**	1.80	2,306	3.23	.0012

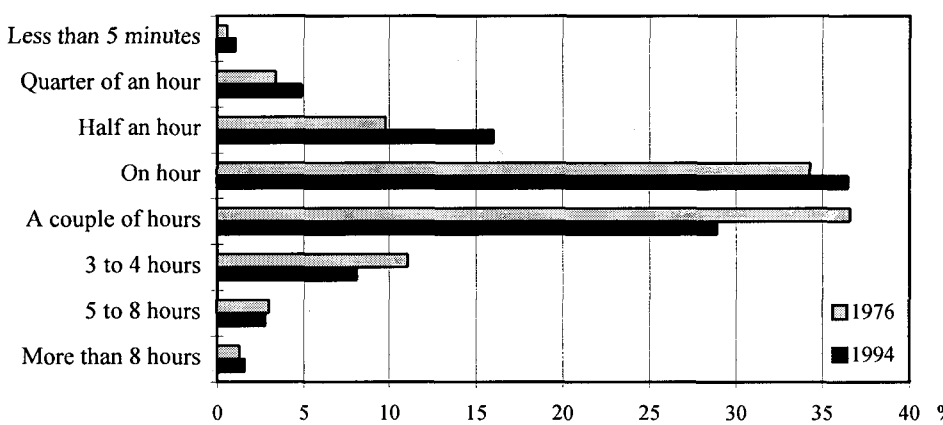

Figure 6. Distribution of the respondents by duration of the last forest visit in 1976 (n=2671) and 1994 (n=2306) (estimated per visitor, χ^2=85.7, df=7, p<.0001).

GEOGRAPHICAL DIFFERENCES IN VISIT DURATION

In the 1994 survey it can be established that the visit duration (calculated per forest visitor) is considerably longer among people living in the metropolitan area than among people living in the rest of the country. It is thus especially in the Copenhagen and related Frederiksberg municipality areas that the *average* visit duration of the inhabitants is high; in other words, the same regions that were characterized by relatively few annual forest visits per individual (Figure 5). As a general tendency, the fewer the forest visits, the longer their duration.

Group composition and collective arrangements

GROUP SIZE

The *most frequent* group size on the forest visitors' last visit was two persons in both 1976 and 1994 (Figure 7). The *median* forest visitors' group in 1976 was three persons. This figure had dropped to two persons in 1994; while the group size per forest visitor had risen from an *average* 4.1 persons to 4.8 persons in 1994 (Table 4).

Both surveys reveal that close to 80% of the forest visitors' last visits were in groups of four or fewer - but with a striking displacement towards groups of one and two in 1994. About five per cent of the forest visitors came in groups of more than 10 persons in 1976, which had changed to just under 10% in 1994.

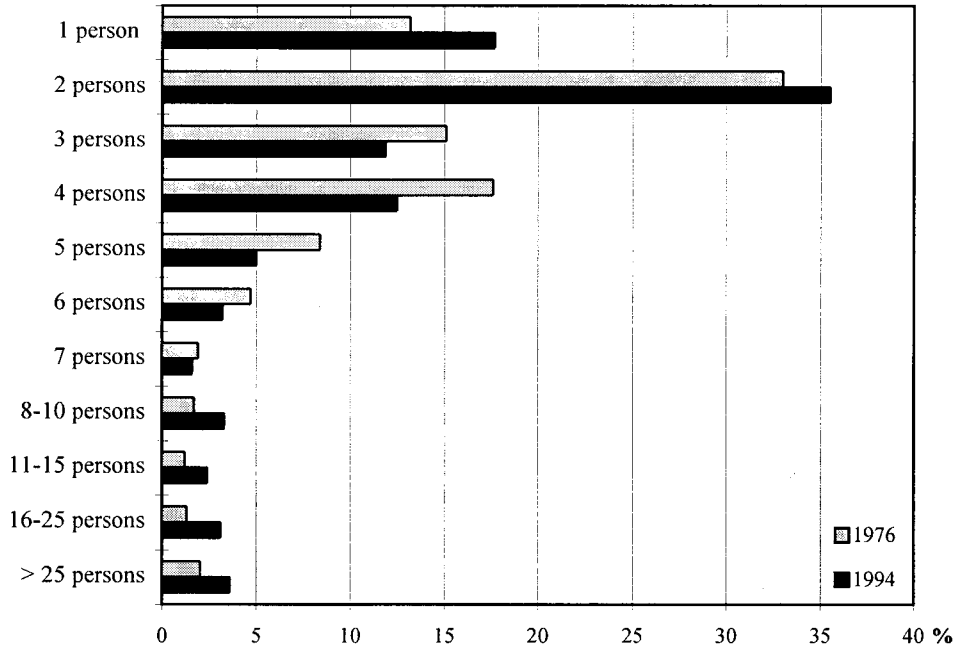

Figure 7. Classified distribution of the respondents by group size during the last forest visit in 1976 (n=2631) and 1994 (n=2250) (estimated per visitor, χ^2=128.4, df=10, p<.0001).

Table 4. The population's average group size during the last forest visit in 1976 and 1994 (estimated per visitor).

Year	Mean $\bar{x}$	Median	SD s	n	t	p
1976	**4.1**	**3**	6.07	*2,622*		
1994	**4.8**	**2**	7.92	*2,231*	3.52	.0004

Note. Due to the coding process, 9 responses in 1976 and 19 responses in 1994 with group sizes >89 were not included in the calculation of the average group size.

The reason why the average group size can rise while there is a striking rise in the number of groups of one and two persons is thus to be found in the fact that the number of the large groups has *also* risen strikingly; in other words a tendency towards more small *and* large groups rather than medium-sized groups - "family groups" - of 3-6 persons.

CHILDREN

The surveys do *not* have information on the independent use of the forests by children (younger than about 15) and people older than about 76. Children's use of the forests *in company* with people belonging to the defined population can however partly be analyzed on the basis of the information provided by the interviewees. It can thus be established that about one third of the respondents were accompanied on their last forest visit - both in 1976 and in 1994 - by at least one child. Figure 8 shows, for the 1994 survey, the distribution of the children's groups by size on the last forest visit *in company* with adults. It is found that when children between 0 and 14 are with the 15-76-year-olds in the forest, there are *most frequently* between one and two children and that the *median* children's group consists of two children.

COLLECTIVE ARRANGEMENTS

The 1994 survey asked a separate question about participation in *collective arrangements* in connection with the last forest visit. 16% of the respondents stated that the last forest visit was part of a collective arrangement of some kind. The type of collective arrangement is typically described as an "outing/picnic" (in about half of the cases), while for example "family trips" is given by just under 20% and sports events by a good 10% of the participants in collective arrangements. Participation in walks with nature interpreters is mentioned by about 1%.

The average group size in collective arrangements can be set at 51, with a median of 15, and 4 as the most frequently occurring group size.

During the review of the responses it was established that there were greatly varying perceptions among the respondents as to *when* something was a

so-called collective arrangement. *If it is assumed* that the respondents who indicated group sizes in collective arrangements of less than 10 persons had partly misunderstood the question, and therefore omit these in the calculations, the result instead is that 10% of the respondents' last forest visits were part of a collective arrangement, and that the average group size was then 72 with a median of 21 and group sizes of 10 *and* 20 as the most frequent.

In 1976 collective arrangements - exercise runs, scout trips, club or association outings, drills etc. - made up about 2% of the forest visitors' last visits. This agreed well with the percentage of the forest visitors' last visits that were made in groups of more than 25 persons. It should be noted that these results were calculated on the basis of the respondents' information in the category "Other" in the question about activities - and thus not by means of a separate question as in the 1994 survey.

Activities

The forest visitors' activities appear in Figure 9, from which the following can be established for both 1976 and 1994: about two thirds of the forest visitors had *among other things* been active by going for a walk in connection with their forest visit. Slightly more than half "enjoyed nature", while exercising, sitting still, taking a drive and walking the dog are all activities that were ticked off by 10-15% of the forest visitors. Activities like riding, hunting and fishing were engaged in by relatively few persons.

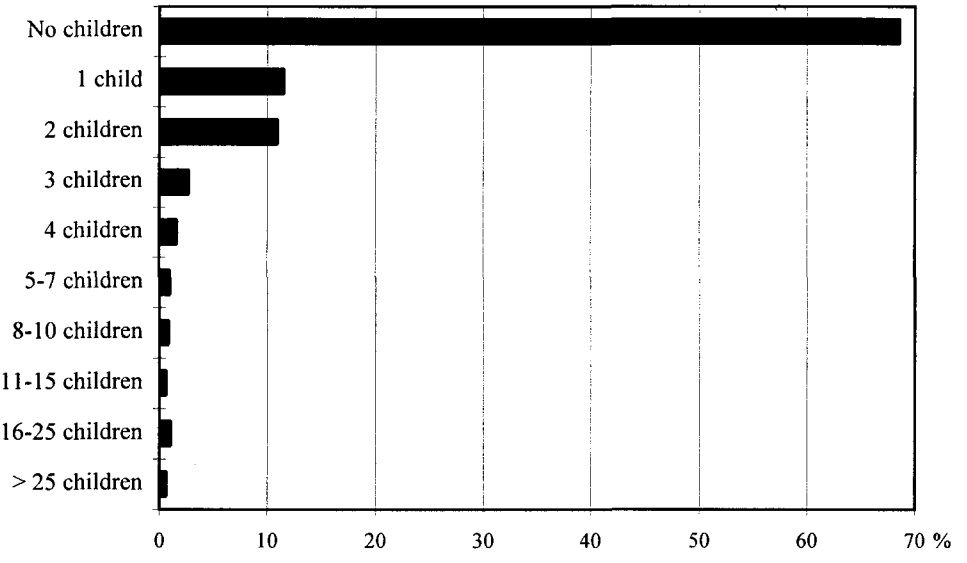

Figure 8. Classified distribution by size of the group of children in company with adults on the last forest visit in 1994 (n=2225) (estimated per visitor).

There have been no striking changes in the activities over the last 20 years or so. One change should however be noted: the drop in the percentage of forest visitors who "studied nature" in connection with their last forest visit - a drop from about 25% to 19%.

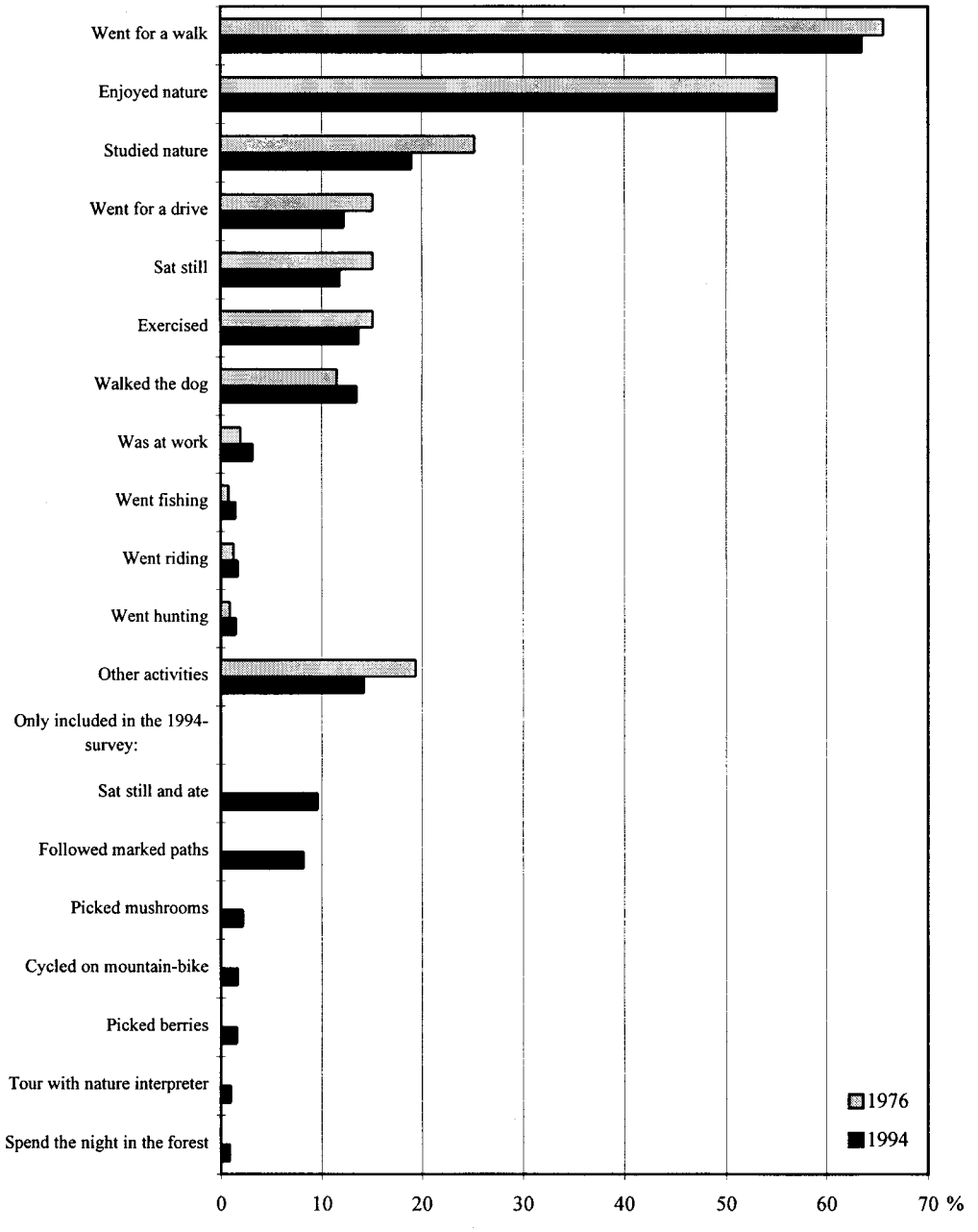

Figure 9. Distribution of the respondents by activities pursued during the last forest visit in 1976 (n=2686) and 1994 (n=2314) (estimated per visitor).

Note. Each respondent ticked off one or more activities.
It should be noted that not all activities were specified as separate activities in the question in the 1976-questionnaire. In the 1994-survey half of the questionnaires sent out included these "extra" activities.

As regards comparisons among the other activities, it should be noted that in half of the questionnaires sent out in 1994 the response options had been extended (Figure 9). These "extra" possibilities presumably influenced the frequency of responses among the directly comparable activities. As one example, the fact that there was a drop of about three percentage points in the activity "went for a drive" should be compared with the fact that the "extra" activity "rode on a mountain bike" shows about 2% participation.

Close to 20% of the forest visitors in 1976 went into more detail in the response categories or listed one or more *other activities*. It must be assumed that these activities would have been selected by more people if they had been on the list (Koch, 1977, p. 41). This assumption is supported by comparisons between the results from 1976 and 1994, where certain "new" activities are specified in the 1994 questionnaire. Finally it should be noted that there is a tendency to an increasing participation in "action" and "thrill-seeking" activities during the period - although still only in a diminutive number compared to the more traditional forest recreation activities.

Transport to the forest

TRANSPORT TIME AND DISTANCE

The *average* transport *time* spent *per forest visitor* on the trip out on their last forest visit was 30 minutes in 1976 - in 1994 the transport time had become 10% less, i.e. 27 minutes. The *average* transport *distance* had also dropped in the 18-year period: from 10.5 km to 8.5 km (Tables 5 and 6). The two corresponding *median* values were 15 minutes and 5 km in both 1976 and 1994.

Some 80% of the forest visitors spent less than about half an hour on transport out to the forest in both 1976 and 1994. Figure 10 further shows clearly that there has been a shift over the 18-year period such that a larger number of the forest visitors spent less time on transport - e.g. a rise from 30% to 40% in the forest visitors who spend less than 5-10 minutes on transport.

Table 5. The population's average transport time (in minutes) out to the forest on their last forest visit in 1976 and 1994 (estimated per visitor).

Year	Mean $\bar{x}$	Median	SD s	n	t	p
1976	**30**	**15**	30.92	*2,661*		
1994	**27**	**15**	30.89	*2,298*	3.27	.0011

Just over two thirds of the forest visitors' last visits were made within a radius of about 10 km from the starting point, just under a third within a transport distance of 2 km in 1976. This has now changed to three quarters and a good third respectively. About 15% traveled more than 20 km from the starting point in connection with their last forest visit in 1976. In 1994 this percentage had dropped to 10% (Figure 11).

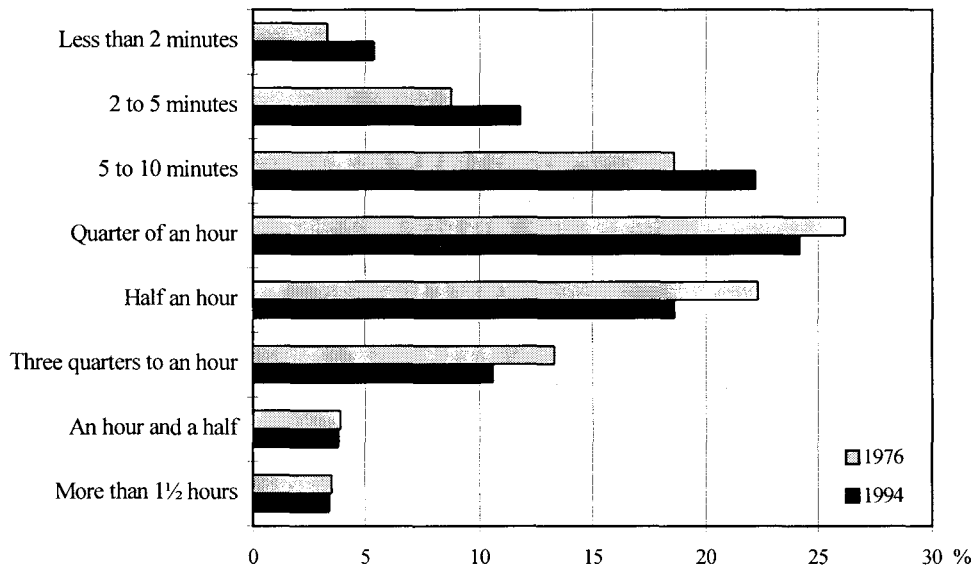

Figure 10. Distribution of the respondents by transport time out to the forest on the last forest visit in 1976 (n=2661) and 1994 (n=2298) (estimated per visitor, χ^2=49.4, df=7, p<.0001).

Table 6. The population's average transport distance (in km) out to the forest on their last forest visit in 1976 and 1994 (estimated per visitor).

Year	Mean $\bar{x}$	Median	SD s	n	t	p
1976	**10.5**	**5**	12.86	*2,525*		
1994	**8.5**	**5**	10.90	*2,200*	5.35	<.0001

Note. Due to the coding process, 35 responses in 1976 and 20 responses in 1994 with transport distances >89 km were not included in the calculation of the average transport distance.

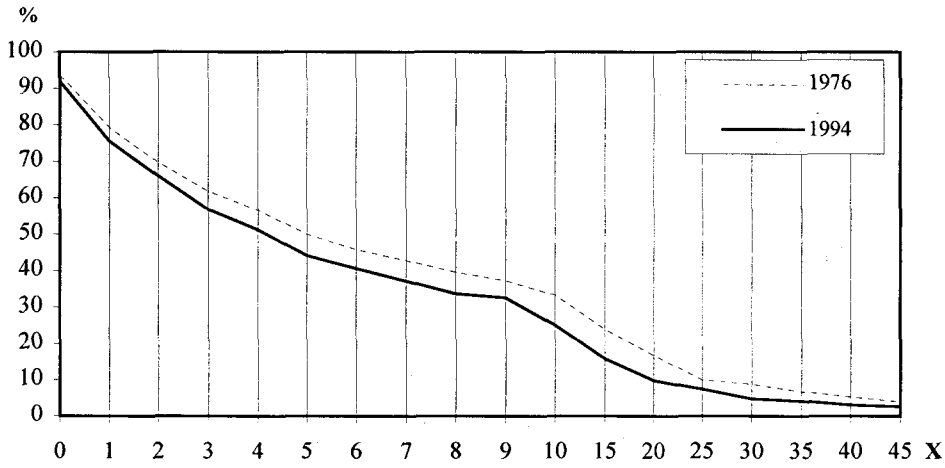

Figure 11. The percentage of the respondents who travelled more than "**X**" km out to the forest on their last visit in 1976 (n=2560) and 1994 (n=2220) (estimated per visitor).

GEOGRAPHICAL DIFFERENCES IN TRANSPORT TIME

Transport time and distance are in general considerably longer in counties where the inhabitants have fewer but longer forest visits.

The relationship between the use of the forests and transport time and distance per forest visitor leaves us with the following overall impression: the longer the transport time/distance on the last forest visit, the more rarely the respondents are in the forest, the longer are the visits to the forest and the more numerous are the participants in the forest trip - all other things being equal (Koch, 1978, p. 336).

MEANS OF TRANSPORT

In 1976 the car, as Figure 12 shows, was the absolutely most frequently used means of transport for forest visits. Just over half of the forest visitors went by car out to the forest on their last forest visit. Half as many, about a quarter of the respondents, walked, while just under 10% cycled. Public transport, bus and train, were used by just over 6%, a moped by about 2%. It can also be observed that the percentage that rode on a horse (0.9%), was rather smaller than the percentage stating that they had been out riding (1.3%). This is in keeping with the fact that the question had asked about *the* vehicle "that was used for the longest distance". In 1994 too the car was the absolutely most frequently used means of transport (49%), while walking on foot (32%), cycling (11%) or public transport (6%), as in 1976, followed in the next places. The ranking of the transport type used is thus unchanged. On the other hand this is not the case with the distribution among the various ways of getting out to the forest: in the 18-year period between the two surveys there has been a striking shift towards more people walking/running or cycling to the forest rather than using the car (Figure 12). A trend which also reflects the fact that the visits have become closer to the towns.

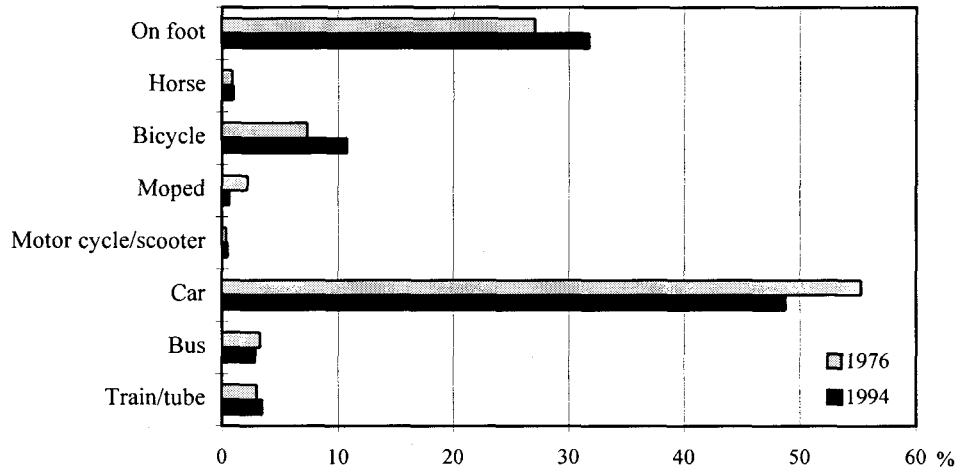

Figure 12. Distribution of the respondents according to the means of transport out to the forest on their last forest visit in 1976 (n=2629) and 1994 (n=2292) (estimated per visitor, χ^2=57.3, df=7, p<.0001).

IMPORTANCE OF TRANSPORT DISTANCE FOR THE CHOICE OF TRANSPORT TYPE

Figure 13 (on next page) shows that in 1994 the forest visitors mainly walked to the forest when it was within a distance of about 2 km from the starting point. Bikes were used by a relatively large percentage of the forest visitors for distances of 1-15 km, and if the last forest visit took place more than 3 km from the starting point, about half of the forest visitors had driven by car to the forest. When the distance was over 8-9 km, the car was used by more than three quarters of the forest visitors. Only for distances longer than 5-6 km did public transport have a certain importance in this respect. Compared with 1976 the importance of the transport distance for the choice of transport type had really only changed in one respect: the distance where a bicycle was used by a relatively high percentage of the forest visitors had increased from about 8 to 15 km (Koch, 1978, pp. 342ff).

Discussion

Number of forest visits and forest visitors: In both 1976 and 1994 about 90% of the adult Danish population spent some time in the forest at least once a year. The average annual *number* of forest visits per individual has grown 15% from 1976 to 1994 - estimated on the basis of questionnaire responses. This corresponds to a rise between 1976 and 1994 of just under 25% in the number of visits to the Danish forests by persons between the ages of 15 and 76 - when the population growth are considered. It should be emphasized here that one of the great disadvantages of collecting information from questionnaires is the risk of

exaggeration. The exaggeration factor *is estimated* here to be of the order 3, which means that *the total annual number of forest visits in 1994 for the adult Danish population is estimated at some 50 million.*

The *average* annual number of forest visits - like the average for income distribution for example - is not an expression of "ordinary" behavior (skewness in the distribution). The relatively few people who go very frequently to the forest (or in the other example, have an extremely high income), will raise the average to an atypically high level. One can get a more characteristic measure by looking at the frequency of visits by the *mid-most person* in the material. This person - the so-called *median Dane* - went to the forest about 11 times in 1976 and about 10 times in 1994.

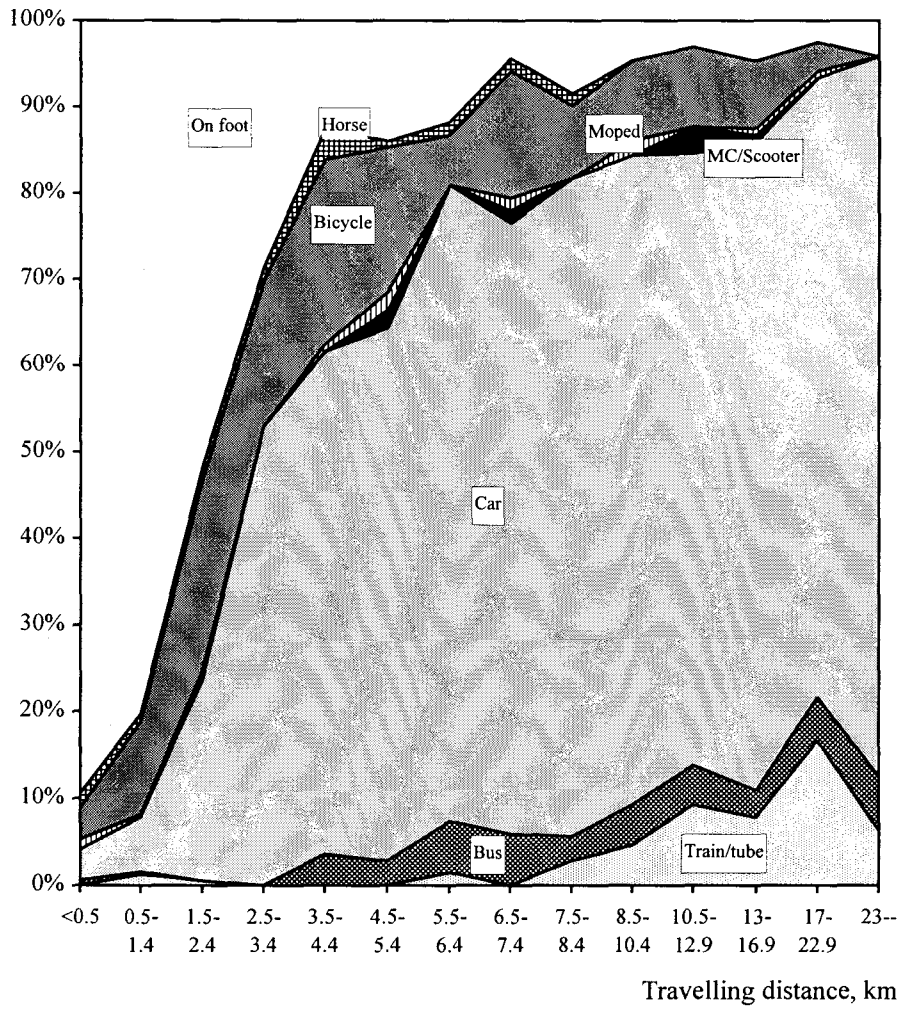

Figure 13. The influence of the travelling distance on the choice of means of transport in 1994 (n=2184) (estimated per visitor).

The rise in the average number of visits can thus be attributed to an increasing number of frequent forest visitors who have a relatively significant effect on the average figure. That the median figure at the same time drops from 11 to 10 visits is due to the fact that, at the same time, a proportionally higher percentage of the population went a fewer times to the forest in 1994 than in 1976.

It can be concluded that the forests attract a considerably higher *percentage* of the adult Danish population than the cinemas, libraries, art exhibitions, theaters and concert halls (both in 1976 and 1994). The forests have thus been able to maintain (strengthen) their position as a very significant recreation opportunity for the population - over a period where leisure options have constantly increased. - A trend which might be seen in the light of a growing accessibility of more areas (for example in connection with nature restoration, afforestation, changes in legislation and more information). - And a growing general awareness/interest in environmental and nature questions by the Danish population?

Duration of forest visits: Over the period 1976-1994 a significant change towards *shorter* forest visits is noted - a tendency which should perhaps be viewed in the light of the above discussion of the *number* of visits. - An indication of a "faster" lifestyle? And is it conceivable that while the struggle for leisure time may well be intensifying, yet since people will not do without their trip to the forest - the actual *duration* of the visit becomes shorter?

Group size on the forest visits: In both surveys it has been noted that close to 80% of the forest visitors' last visits were in groups of four or fewer persons - but with a striking shift towards groups of one or two persons in 1994. The tendency towards more small groups rather than medium-size groups - "family groups" - of 3-6 persons accords well with the general development of the population in the Danish society; i.e. a more "individual" lifestyle where an increasingly higher percentage of the population lives alone. Some of the reasons for this are that a smaller percentage of the population lives in couples; that families are having fewer children; and that families with children have the children living at home for fewer years. Thus if 1980 is compared with 1994 it is seen that in general more people are living alone in 1994 than in 1980 in all age groups above the age of 21 (for the 30-year-olds, for example, the percentage has risen from 9% to 15%) - thus today more than every second household consists of a single person (Danmarks Statistik, 1995, pp. 16-17).

In addition to the shift towards the smaller groups also a trend towards more visitors in larger groups are seen - a polarization which might be due to a growing supply of more opportunities to take part in organized events - like e.g. guided walks with nature interpreters.

Activities during the forest visits: The following can be established in connection with both the 1976 and the 1994 survey: about two thirds of the forest visitors had among other things gone for walks on their last forest visits. Just over half had "enjoyed nature", while exercise, sitting still, going for a drive and walking the dog are activities that were all ticked off by 10-15% of the forest visitors. Activities like riding, hunting and fishing were engaged in by relatively few visitors to the forest (1-2%). There have been no striking changes in the

activities over the last 20 years or so, which accords well for example with a previous American survey which showed that very few activities changed dramatically over a period of 20 years (Bevins & Wilcox, 1980). It should however be noted that there is a tendency to an increasing participation in "action" and "thrill-seeking" activities during the period - although still only in a diminutive number compared to the more traditional activities.

Transport time, transport distance and means of transport to the forest: The average transport time spent per forest visitor on the journey out on the last forest visit was 30 minutes in 1976 - in 1994 the transport time had decreased by 10%. The average transport distance had also dropped in the 18-year period: from 10.5 km to 8.5 km - a similar trend which is found in connection with the recreational use of the countryside in England and Wales from 1977 to 1984 (Countryside Commission, 1985, pp. 15-16). In 1976 the car was the absolutely most frequently used transport type for forest visits followed by walking and bicycling. In 1994 too the car was the absolutely most frequently used means of transport (49%), while walking (32%) or cycling (11%) were in the next places as in 1976. The ranking of transport types is thus unchanged. This is however not the case with the relative distribution of the various ways of getting to the forest: in the 18-year period between the two surveys there was a striking change towards more people walking/running or cycling to the forest rather than using the car.

The transport distance has a crucial effect on the choice of transport type. In both 1976 and 1994 the forest visitors mainly walked to the forest when it was within a distance of about 2 km from the starting point. Cycles were used by a relatively large percentage of the forest visitors for distances of 1-8 km in 1976 and 1-15 km in 1994. If the forest visit was more than 3 km from the starting point, about half of the forest visitors drove by car to the forest. When the distance was over 8-9 km, the car was used by more than three quarters of the forest visitors. Only for distances longer than 5-6 km did public transport have some significance in this respect.

There is of course a clear connection between the results for transport time, transport distance and means of transport to the forest. The results reflect a change in the transport patterns in the score of years between the two surveys. The fact that the car is now used less than before could be seen in the light of the circumstance that motoring today is perhaps less of an attraction in itself than it used to be in the Danish society of the early seventies - for example many adults (and children as well) would today probably view taking a bicycle out to the forest as more exciting than sitting in a car - as more and more do on ordinary days. That the transport distance has decreased may be due to the accessibility of more areas has been improved (for example in connection with nature restoration, afforestation, changes in legislation and more information) - but the expansion of the walking and cycling path systems may also play a role in the changing transport pattern (some 2/3 of the forest visits were to the forest closest to the home). - Results which indicate a growing pressure on the urban forests.

The connection of forest use with transport time, distance and type thus leaves the following main impression: the shorter the transport time/distance on

the forest visit, the more frequent the visits to the forest, the shorter the visit to the forest, the fewer participants in the group and the rarer the use of a car to get to the forest - an impression which at the same time illustrates the general direction of development in Danish forest recreation over the last 20 years. - A trend which is probably not unique for Denmark. The same direction of development is found in Sweden by Kardell & Lindhagen (1995) in their study of the changes in forest recreation from 1975 to 1992 of the citizens of a medium sized town in southern Sweden (Växjö).

Acknowledgments

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References

Ahlin, T. (1993). *Kulturvanor i Norden. En undersökning av kultur- och medievanor i de nordiska länderna (Culture Activities in the Nordic Countries)* (Statistical Reports of the Nordic Countries no. 62). Copenhagen, Denmark: Nordic Statistical Secretariat.

Bevins, M. I. & Wilcox, D. P. (1980). *Outdoor recreation participation: analysis of national surveys, 1959-1978* (Vermont Agricultural Experimental Station Bulletin 686). Vermont: University of Vermont.

Blalock, Jr., H. M. (1972). *Social Statistics.* Tokyo: McGraw-Hill Kogakusha.

Christensen, J. B. (1994). Danmark fordobler sit skovareal. *Natur og Miljø, 1994, 4*,16-19.

Countryside Commission (1985). *National countryside recreation survey 1984* (CCP201). Cheltenham,UK: Author.

Danmarks Statistik (1994). *Skove og plantager 1990.* Copenhagen, Denmark: Author & Skov- og Naturstyrelsen.

Danmarks Statistik (1995). Statistisk tiårsoversigt 1995. Copenhagen, Denmark: Author.

Fodgaard, S. (1995). Nye statsskove i 1994. *Skoven, 27*, 390-391.

Friluftsrådet (1997): *Friluftsliv for alle.* Copenhagen, Denmark: Author.

Jensen, F. S. & Koch, N. E. (1997). *Friluftsliv i skovene 1976/77 - 1993/94* (The Research Series no. 20). Hørsholm, Denmark: Danish Forest and Landscape Research Institute.

Jeppesen, J. (1974). *Statistisk Induktion.* Aarhus, Denmark: Akademisk Forlag.

Kardell, L. & Lindhagen, A. (1995). *Förändringar i Växjöbornas friluftsliv mellan 1975 och 1992* (Report ISRN SLU-SLV-R-59-SE). Uppsala, Sweden: The Swedish University of Agricultural Sciences, Department of Environmental Forestry.

Kardell, L. & Pehrson, K. (1978). *Stockholmarnas friluftsliv: vanor och önskemål* (Report no. 13. 1978). Uppsala, Sweden: The Swedish University of Agricultural Sciences, Section of Environmental Forestry.

Koch, N. E. (1977). *Skovenes friluftsfunktion. Præferencemåling. Tidligere anvendte metoder* (Arbejdsnotat nr. 4). Copenhagen, Denmark: The Danish Forest Experiment Station.

Koch, N. E. (1978). Skovenes friluftsfunktion i Danmark. I. del. Befolkningens anvendelse af landets skove. (Forest Recreation in Denmark. Part I: The Use of the Country's Forests by the Population). *Forstl. Forsøgsv. Danm., 35*, 285-451.

Koch, N. E. (1980). Skovenes friluftsfunktion i Danmark. II. del. Anvendelsen af skovene, regionalt betragtet. (Forest Recreation in Denmark. Part II: The Use of the Forests Considered Regionally). *Forstl. Forsøgsv. Danm., 37*, 73-383.

Koch, N. E. (1984). Skovenes friluftsfunktion i Danmark. III. del. Anvendelsen af skovene, lokalt betragtet. (Forest Recreation in Denmark. Part III: The Use of the Forests Considered Locally). *Forstl. Forsøgsv. Danm., 39,* 121-362.

Koch, N. E. & Jensen, F. S. (1988). Skovenes friluftsfunktion i Danmark. IV. del. Befolkningens ønsker til skovenes og det åbne lands udformning. (Forest Recreation in Denmark. Part IV: The Preferences of the Population). *Forstl. Forsøgsv. Danm., 41,* 243-516.

Lindhagen, A. (1996a). *Forest Recreation in Sweden. Four Case Studies Using Quantitative and Qualitative Methods*(Report ISRN SLU-SLV-R-64-SE). Uppsala, Sweden: The Swedish University of Agricultural Sciences, Department of Environmental Forestry.

Lindhagen, A. (1996b). An approach to clarifying public preferences about silvicultural systems: A case study concerning group selection and clear-cutting. *Scand. J. For. Res., 11,* 375-387.

National Forest and Nature Agency (1995). *Experiencing the State Forests. Outdoor life on the areas of the National Forest and Nature Agency.* Copenhagen, Denmark: Author.

Potter, D. R., Sharpe, K. M., Hendee, J. C., & Clark, R. N. (1972). *Questionnaires for Research: An Annotated Bibliography on Design, Construction, and Use* (Res. Pap. PNW-150). Portland, OR: Pacific Northwest Forest and Range Experiment Station.

SAS Institute Inc. (1982a). *SAS User's Guide: Basics* (1982 edit.). Cary, NC: Author.

SAS Institute Inc. (1982b). *SAS User's Guide: Statistics* (1982 edit.) Cary, NC: Author.

Skov- og Naturstyrelsen (1996). *Årsberetning 1995.* Copenhagen, Denmark: Author.

Smith, T. W. (1994). Is There Real Opinion Change? *International Journal of Public Opinion Research, 6,* 187-203.

Whiteman, A. (1993). *Using household surveys to estimate forest visitor numbers* (Research Information Note 237). Farnham, Surrey, UK: Forestry Commission, The Forestry Authority.

PAPER IV

Changes in the forest preferences of the Danish population from 1977 to 1994

Frank Søndergaard Jensen (1997)

Manuscript

Changes in the forest preferences of the Danish population from 1977 to 1994

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Abstract

Research of changes of forest and landscape preferences over time has been very limited so far, especially in relation to changes of the general population. Results based on two surveys of the forest preferences of the Danish adult population are given. A postal questionnaire survey of 2826 individuals (response-percentage 89.4%) was carried out in the period from April 1977 to April 1978, on the basis of a representative sample of the Danish population (15-77 years old). This survey was repeated (and renewed) from November 1993 to November 1994 on another representative sample of 2916 adult individuals (response-percentage 83.7%). The "Experimental Method" was used to measure the preferences of the population: 52 black and white photos (plus 12 new in the 1993-94 survey) and 100 verbal stimuli which were pairwise or groupwise alike except for one factor - the topic under investigation - were used to represent the forest. The results are grouped according to the character of the forest management actions which might influence the quality of an outdoor recreation experience, i.e. actions in relation to the silvicultural system, the choice of tree species, regeneration and tending of stands, recreation facilities and influences related to recreational use. In addition, results on environment-related influences and nature in general are presented. As main results it is found that the forest preferences of the Danish population during the period from 1977 to 1994 have been very stable. No completely alteration in preferences has been found, only a few changes has occurred. Among these (minor) changes are the assessment of: natural regeneration; large/small unit forestry; age of the forest stand; use of herbicides and fertilisers; paths and visitor facilities; effect of information; meeting other forest visitors.

Keywords: Forest preferences; outdoor recreation; trends; general population; questionnaire; Denmark.

1. Introduction

A number of arguments in favour of surveying the forest preferences of the general population can be adduced, e.g.:

1) society is apparently prepared to defray relatively large expenses in order to satisfy the population's need for outdoor recreational activities (e.g. Skov- og Naturstyrelsen, 1996);
2) several surveys have shown that forest and landscape managers' own preferences - or their perception of visitors' preferences - do not always agree with the visitors' preferences(e.g. Hendee and Harris, 1970; Willhite and Sise, 1974; Hultman, 1981; Jensen, 1993). The latter divergence from the standpoint of "the producers'" perception of "the users'" desires is explained as follows by Hendee and Harris (1970, p. 762):
   "... since a large part of their work results from problem users, it would be strange indeed if their perception of typical users were free of bias.";
3) the lack of knowledge of the different preferences of forest visitors makes the manager an easy victim of what Gregory has called management according to the "the squeaking wheel principle": 'the wheel that squeaks the loudest gets the oil'. The dissatisfaction of the more well-formulated interest groups is minimised, which hardly leads to optimisation of the total satisfaction of needs, but rather to the formulation of a mediocre compromise (Gregory, 1972, pp. 405 f).

However, preference measurements only constitute a part of the politicians' and administrators' decision information, even in areas where recreational activities are given the highest priority. It must be remembered that, as far as the preferences of visitors and the population in general are concerned, the following applies:

"These desires may be impossible, selfish and conflicting, based on faulty data, short sighted, and changing or capable of being changed." (Lucas 1966, p. 121). - *Are* the desires/preferences then changing over time?

At the global level, a great number of surveys have been conducted on the preferences of different population segments for different types of landscape. One of the most comprehensive bibliographies from the seventies - which is nonetheless rather incomplete - contains 2058 references (Goodey et al., 1975). (For an overview of empirical preference research, see e.g. Ribe (1989); an overview of some of the latest Scandinavian surveys is given by Jensen (1995), Axelsson-Lindgren (1995), Komulainen (1995) and Lindhagen (1996a)).

Forest and landscape preference research has been in progress since around the mid sixties (e.g. Goodey et al., 1975, p. IV). Due to the fact that it is a relatively new research field not very many studies seems to have touched upon the change of the preferences over time (Table 1), and when it comes to research covering the trends of the *general population* the number seems dimi-

Table 1. Examples of surveys touching upon the change of forest preferences/attitudes over time - the main characteristics.

Reference	Country	Area(s)	Years	Population	Sample size	Response %	Approach
Lucas, 1985	USA	Bob Marshall Area, Montana	1970 / 1982	Visitors > 15 years	552 / 972	91 / 82	Mailed questionnaire
McCool and Stankey, 1986	USA	Selway-Bitterroot Wilderness Area, Montana	1971 / 1984	Visitors	217 / 330	84 / 83	Mailed questionnaire
Cole et al., 1995	USA	Boundary Waters Canoe Area Wilderness, Minnesota	1969 / 1991	Visitors > 15 years	208 / 290	73 / 74	Mailed questionnaire
		Shining Rock Wilderness, North Carolina	1978 / 1990	Permit holders / Visitors > 15 years	547 / 585	78 / 75	Mailed questionnaire
		Desolation Wilderness, California	1972 / 1990	Permit holders	581 / 528	85 / 83	Mailed questionnaire
Palmer, 1997	USA	Dennis, Massachusetts	1976 / 1987	Adult citizens	96 / 36 (respondents)	? / ?	Questionnaires at a meeting / Mailed Questionnaires
Kardell and Holmer, 1985	Sweden	Bogesundslandet	1969-70 / 1981-82	Visitors	? / 182 (mail) 277 (personal)	? / 78 (mail), 96 (personal)	Mailed questionnaires (car visitors) and personal interviews
Kardell and Lindhagen, 1995	Sweden	Växjö, 3 recreation areas	1975 / 1991	Visitors	447 / 575 (respondents)	? / ?	Personal interviews
Lindhagen, 1996a	Sweden	Växjö	1973 / 1991	Citizens of Växjö, 15-75 years	387 / 570	69 / 83	Mailed questionnaire
Lindhagen, 1996b	Sweden	Hammarskog and non-site specific photographs	1983 / 1990	2nd year students of agriculture	22 / 29 (respondents)	(100 ?)	Forest visit and mailed questionnaire

nutive (zero?). - The following will give the results of a Danish approach to elucidate the question of preference changes over time of the general population.

2. Survey method

2.1 Introduction

A number of reviews and bibliographies on methods of measuring preferences/perception of different forest and landscape types have been compiled (cf. e.g. the references of Koch 1977a; Zube et al., 1982; Hultman, 1983a; Ribe, 1989). Common to all of these surveys is their failure to designate any measuring method as being *the* most suitable.

This section describes how the preference surveys (the *Experimental Method*) developed at the Danish Forest and Landscape Research Institute are implemented.

In the Experimental Method, respondents assess *black-and-white photos*, which, taken in pairs or in groups, only differ in respect of a single factor. In addition, a series of less ambiguous subjects, which are only described verbally, are assessed. Assessment is carried out by each individual *ranking* 7 randomly selected photos and 7 randomly selected *verbal stimuli*. This method, which was developed by Koch (1974 , 1977a and 1977b), is distinguished by its experimental design and by its ability to embrace many survey topics.

Data acquisition has been carried out in two national *postal-questionnaire* based surveys in 1977/78 and 1993/94 (henceforth referred to as 1977- and 1994-data) (Koch and Jensen, 1988; Jensen and Koch, 1997).

Although the use of questionnaires is considered one of the most usable and fruitful data acquisition techniques in the social sciences - on condition that the technique is applied with reason - the disadvantages should not be neglected. Experience of this can be summarised with a quotation from an extensive study of the literature and methods, conducted for the U.S. Forest Service: "... the complexities of using questionnaires for research are often vastly underrated. The popularity of the method often rests on ignorance of associated problems of data analysis, bias, reliability, and validity of results." (Potter et al., 1972, p. 1).

In his overview of empirical preference research, Ribe (1989, p. 58) also mentions the problems of a general limited validity due to the consideration of "limited landscapes judged by relatively small groups of subjects". - The following will elaborate how the two Danish surveys have been working at these problems.

2.2 Population and sampling technique

The Danish population is required to register births, marriages, deaths, changes of address, etc. This provides a very reliable sampling frame (the Civil Registration System, Ministry of the Interior) from which a systematic gross

random sample consisting of respectively 2826 and 2916 persons has been drawn in 1977 and 1993, representing the adult Danish population, 15-77 years (Table 2). Although the interviewees were randomly selected from a suitable list of a well defined population, it would be justified to ask whether the sample "represents" the defined population. Therefore both samples are investigated to see whether they differ from the total population with respect to (1) age distribution for men, women and all; (2) age distribution within each county; (3) gender distribution; and (4) geographical distribution within counties according to men, women and all. - No significant differences between the samples and the defined population have been identified. Therefore it can be concluded that the selected interviewees represent the resident population in Denmark (excluding Greenland and the Faroe Islands) aged 15-77 in 1977, respectively 1993 (Koch and Jensen, 1988, pp. 276f; Jensen and Koch, 1997, pp. 142f).

The season is assumed to be a factor that influences forest preferences. There are two alternatives when results are desired to cover the conditions of an entire year, i.e. either to let the interviewee generalise for the period or to ask at representatively distributed times. The former approach is assumed to diminish the results' validity (external validity). That is why the postal-questionnaires were sent out in 12 lots on a randomly sampled day in each month in the periods from April 1977 to April 1978 and November 1993 to November 1994.

The following initiatives were made to increase the response rate:

1) care in the formulation of the questionnaire-packet's physical appeal;
2) care in the design of the verbal prompting to respond;
3) stamped and addressed reply-envelope;
4) brief and simple questionnaire;
5) potential personal gain for respondents (lottery only in the 1977-survey);
6) the use of up to 3 reminders, mailed after 2, 3 and 5 weeks.

Table 2. The sample and response-percentages of the 1977- and 1994-survey.

	1977	1994
Gross random sample	2826	2916
Reduction of the population by death and emigration before contact	6	21
Net random sample	2820	2895
Number of non-respondents	300	471
Number of respondents	2520	2424
Response-percentage	89.4	83.7

2.3 The Experimental Method

2.3.1 GENERAL NOTES ON SELECTION OF SURVEY TOPICS

When choosing the topics to be assessed by the selected persons, weight was attached to: (1) whether or not the topic could be expected to exert influence on the experience of the forest visitor, (2) whether or not it has any commercial or socio-economic significance, and/or (3) whether or not the given conditions can be regulated by the forest manager. (See e.g. Koch (1977b, pp. 6-10) for a review of relevant topics).

2.3.2 BLACK-AND-WHITE PHOTOS

Survey topics that cannot be described sufficiently unambiguously and defined clearly in words - verbal stimuli - are assessed on the basis of black-and-white photos. The Experimental Method means that the photos are considered in pairs or groups which, to the extent possible, only differ in one single aspect, namely the factor/topic to be assessed. Thus, the photos are grouped in "blocks", which were taken for direct mutual comparison (see e.g. Figs. 5 or 6 for "classical" examples of a "block"). Apart from this, all photos can obviously be compared to each other, although conclusions must be drawn with greater care due to the less standardised conditions of recording the photos.

In taking the photos, great weight was attached to ensuring that photos in a given "block" appear as uniform as possible - apart from the factor/topic under assessment, e.g.:

1) in order to ensure identical natural shadowing, all photos in a "block" were taken within one hour and in the same geographical direction;
2) the same type of film was endeavoured used for all photos (KODAK TRI-X PAN);
3) all photos in a "block" were taken at the same aperture and distance to ensure identical depth of field in all photos;
4) it was endeavoured to make the composition of the pictures as uniform as possible;
5) the same camera and same lens (f 2.8/50 mm) were used;
6) in order not to emphasise certain details of the topic, photos were taken with a high depth of field, which necessitated a small aperture. This decision was partially responsible for the choice of a fast film and the use of a tripod and cable release.

A total of 52 black-and-white photos were assessed in the 1977-survey and 64 in the 1994-survey. The reader is referred to Jensen and Koch (1997), in which the photos are reproduced in the same size and quality as mailed with the questionnaires.

2.3.3 VERBAL STIMULI

A number of topics have been assessed only on the basis of verbal formulations, i.e. the so-called "verbal stimuli". This has happened when it was considered possible to describe the topic under investigation relatively

unambiguously to the respondents, for example: "A hare", "A bicyclist" and "A family in the woods with their dog on a leash".

In most cases - but not as obviously as in the case of the photos - the verbal stimuli were designed according to the Experimental Method: they belong to a "block" of stimuli that deviate only with respect to a single factor - the factor under assessment.

The assessment of a total of 100 verbal stimuli were sought in both surveys (Koch and Jensen, 1988; Jensen and Koch, 1997) and were printed in green, on yellow cards of the same size as the black-and-white photos (98 x 134 mm).

Certain survey topics have been assessed on the basis of a photo *and* a verbal stimulus (e.g. a bench, a horseman, a fence around some young trees, etc.), which makes it possible to perform mutual checks.

2.3.4 RANKING

The following technique were used to facilitate elucidation of the population's preferences:

Question 10A: Out of the total of 52/64 black-and-white photos of different forest environments, 7 photos were randomly selected for each interviewee and appended to the questionnaire in a red envelope. Guided by explanations on the questionnaire and envelope, interviewees were asked to rank the 7 photos according to the criterion:

"WHICH WOODLAND ENVIRONMENT DO YOU PREFER TO VISIT?"

Question 10B: Out of the total of 100 verbal stimuli, 7 cards with verbal stimuli were randomly selected for each interviewee and appended to the questionnaire in a blue envelope. The interviewees were asked to rank the text on the 7 cards according to the criterion:

"WHAT DO YOU PREFER TO MEET IN THE WOODS?"

Thus, the survey produces a series of independent rankings, made by a representative sample of the population, of a number of different topics (presented as black-and-white photos and/or verbal stimuli), in a number of different, randomly selected combinations. On the average, each photo was respectively ranked about 335 and 260 times by the respondents and each verbal stimulus about 175 and 165 times in the two surveys. Thus, a basis for comparing the internal ranking of the photos and of the verbal stimuli were obtained.

The reason for using only 7 photos and 7 verbal stimuli/respondent is that respondents experience difficulty in ranking a greater number of topics on the same occasion (e.g. Miller, 1956; Koch, 1977a, p. 43).

The photos and verbal-stimulus cards are each numbered with a 3-digit number. The first digit was added to reduce the chance of the numbering affecting the assessment. For the same reason, the photos that belong to a given

"block" are marked as far as possible with the same digits, only in different sequences (cf., e.g. Fig. 1).

2.4 Processing and analysis of data

Data merging, error tracing and analysis were primarily carried out using SAS (Statistical Analysis System), (SAS Institute Inc., 1982a, 1982b).

When analysing the data obtained by the Experimental Method, 7 points were awarded to the photo/card with verbal stimuli that received the highest ranking, 6 points to the next highest, and so on, down to 1 point for the photo/card that received the lowest ranking. The mean point value for each photo/card was then calculated, after which these means were compared to each other by classical analysis of variance (PROC GLM in SAS).

However, this procedure is based on the assumption that the data was measured on an interval scale, whereas ranking of the seven photos/cards only gives a result measured on an ordinal scale. However, ordinal data can be treated as interval data if certain conditions are fulfilled (e.g. Johnson and Creech, 1983). The results of analysis of variance for all 21 blocks of black-and-white photos in the 1977-survey were compared to the results of three non-parametric statistical tests, which were devised for comparing mean values measured on an ordinal scale - no differences were found (Koch and Jensen, 1988, pp. 396-398).

2.5 Sources of error

Errors of different types are associated with this type of surveys:

1) sampling error;
2) non-response error;
3) measurement error;
4) errors due to coding, editing and tabulating.

2.5.1 SAMPLING ERROR

It is possible to calculate the error introduced by considering only a single sample out of a large number of possible samples. The absolute sampling error of the two surveys are better than ±2% of the frequencies found (95% confidence-limits).

2.5.2 NON-RESPONSE

The response rates of the two surveys are shown in Table 2. The relatively high response rates are probably due to a combination of various factors, including the subject of the surveys.

To determine whether or not non-response destroys the "representativity" of the samples, the distribution of all respondents over the most vital grouping factors has been compared to the distribution of the adult Danish population - no significant differences were discerned.

2.5.3 MEASUREMENT METHOD

In the case of preferences it is only the interviewees who are able to supply the desired information. Furthermore, it is difficult to differentiate objectively between a considered opinion and an opinion adopted in haste. Finally, there is considerable risk of generalisation, idealisation and strategic responses.

Minimising the measurement errors has been attempted through a careful design of the questionnaire and by trying to avoid any direct influence on the data collection - and using the same methodology in the two data collections. The question of using the same methodology is very well described by Smith (1994, p. 200): "When it comes to measurement variation and the study of opinion change, there are two lessons to be learned and followed: first, 'The way to measure change is not to change the measure.'...".

Moreover, as several control questions were built into its design, the survey method facilitated error checking. A number of validity tests have therefore been implemented, e.g. criterion-related validity (predictive- and concurrent-validity), content-validity and construct-validity (Koch and Jensen, 1988, pp. 405-409). Due to these precautions and tests, it is concluded that the surveys are not generally encumbered by large measurement errors.

2.5.4 DATA PROCESSING AND ANALYTICAL METHODS

Punch checks have contributed to the fact that it has only been possible to detect a very few punching errors. The processing of the data was carried out with a well-reputed, proven statistical program package (SAS).

3. Results - an introduction

The result sections are arranged by issue; issues are grouped according to the nature of the *influences* that can be expected to affect the quality perceived by people during recreational activities:

1) *environment-related influences:* influences over which the forest manager normally has no control (e.g. aircraft noise and climate);
2) *management-related influences*, which are subdivided into the following issues:
   - nature in general;
   - the silvicultural system;
   - the choice of tree species;
   - regeneration, formation and tending of stands;
   - recreation facilities and natureinterpretation/information;
3) *influences related to recreational use:* influence of recreational use on the quality perceived by individuals in their recreational activities.

The issue-oriented review presents selected results. Wherever possible, results are presented from both surveys - 1977 and 1994, which offer the direct

possibility of assessing trends in the preferences of the general Danish population over a period of more than 15 years.

4. Results - environment-related influences

As mentioned, "environment-related influences" should be understood in this context to be factors that affect the quality of people's perception of the recreational experience, but over which the forest manager cannot normally exercise any control (e.g., weather and noise conditions). One single verbal stimulus concerns this issue:

"Silence".

It must be considered noteworthy that this stimulus attained the highest average number of points of all 100 verbal stimuli - in 1977 and 1994 (6.73 and 6.61, bearing in mind that it was possible to award from 1 to 7 points). There is also great agreement on this, as the standard deviation of responses to this stimulus was the next lowest and seventh lowest, respectively. In the 1977-survey, only the verbal stimulus "10 moped riders" showed a smaller standard deviation. In fact, this verbal stimulus ranked lowest - and can in a sense be interpreted to be the opposite of "Silence." The same trend was apparent in 1994, as "10 moped riders" was once again ranked lowest, with a standard deviation slightly below that of "Silence."

The interpretation of this result is, however, complex: It can hardly be solely physical silence that has this meaning; is not, for instance, the song of a bird consistent with "Silence"? - Perhaps the result actually say more about an important *reason* for forest visits than could be revealed by several more direct questions. Finally, it should be remembered that our understanding of the concept of "Silence" varies, of course, from person to person, from place to place and from time to time.

5. Results - management related influences

In this and the following sections, results concerning management-related influences are presented. These influences are subjected to a detailed study, since the manager can obviously control them to a relatively great extent.

5.1 Nature in general

This introductory, and more general, section on nature in general is followed by an analysis of the many different influences on recreational experience that result from a forest management programme.

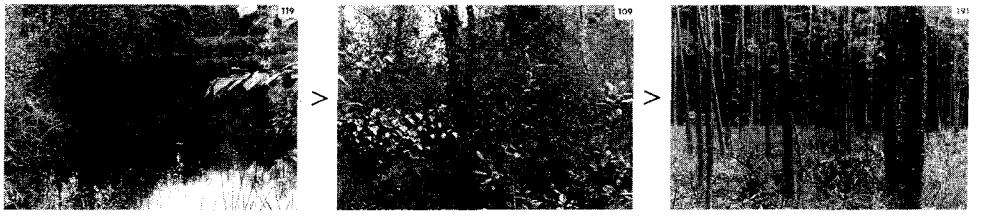
5.1.1 WETLANDS

The three photos of Fig. 1 illustrate three alternatives in a forest: conservation/establishment of a forest lake; natural regrowing; or draining and planting with ash trees. As shown by Fig. 1, the general population considered in 1977 and 1994 the forest lake to be by far the best alternative. Moreover, a bog undergoing regrowing is preferred to a bog planted with ash trees. - Results which are confirmed by responses to verbal stimuli as well, and which also revealed a high valuation of watercourses in the forest in both surveys.

1977

(No. 119: $R = 3$; $\bar{x} = 5.74$) > (No. 109: $R = 21$; $\bar{x} = 4.22$) > (No. 191: $R = 28$; $\bar{x} = 3.71$)

1994



(No. 119: $R = 2(2)$; $\bar{x} = 5.95$) > (No. 109: $R = 27(21)$; $\bar{x} = 4.28$) > (No. 191: $R = 43(33)$; $\bar{x} = 3.49$)

Fig. 1. According to the mean assessment of the population in 1977 and 1994, a woodland lake (no. 119) ranks higher in preference than a naturally regrowing bog (no. 109), which, in turn, ranks higher than a bog planted with ash (no. 191).

NOTE: A total of 52 black-and-white photographs were included in the 1977-survey. These 52 photographs, together with 12 additional photographs, (a total of 64 photographs) were included in the 1994-survey. R indicates the ranking of all 64 (52) photographs used, according to the population's average assessment ($\bar{x}$), from 1 (highest) to 64 (52) (lowest). A '>' sign between photographs indicates a significant difference (α=0.05). For a more direct comparison of the results of the two surveys, the 1994-results indicated by ( ) gives the rank of a photograph when only considering the 52 photographs which were common to both surveys.

5.1.2 ANIMALS

Preferences for animals were studied with the aid of 6 verbal stimuli and black-and-white photo no. 150. In both methods, it was observed that seeing "A roe-deer" in the forest is valued extremely highly.

Photo no. 150 shows a road through a coniferous forest, in which a roe-deer can be seen - although not very clearly. The photo was ranked 1, respectively 4 in 1977 and 1994. Without a roe-deer (photo no. 110), the otherwise identical photo only attained a rank as no. 15, according to the population's mean assessment in 1977, and no. 20, in 1994 (Fig. 8).

In analogy to the above results, Table 3 shows that the verbal stimulus: "A roe-deer" attained the next highest placing of all verbal stimuli used in both surveys - exceeded only by "Silence". As can be seen from the table, it is also extremely popular to encounter the other birds and mammals studied, whereas the insects under investigation are unpopular (insects are mainly included due to validity tests). In the 1977-survey, two species of insect were studied to provide a validity control (Koch and Jensen, 1988, p. 408). In 1994, "(Gall) midges" was replaced by "A squirrel", Table 3 shows that encountering a squirrel during a forest visit is as popular as seeing a roe-deer - when the population's mean assessment is considered.

5.2 The silvicultural system

An obvious question is whether or not it is necessary to study the general population's desires on formation of the forest. Is it not a "fact" that people prefer *variation*?

Table 3. The general population's mean assessment of 6 verbal stimuli concerning different species of animals in 1977 and 1994.

Year	No.	Verbal stimuli	Rank[a] R	Mean score $\bar{x}$	t-tests LSD[b]
1977	17	A roe-deer	2	6.53	
	19	A pheasant	8	6.21	
	18	A hare	9	5.88	|
	20	A black woodpecker	10	5.81	|
	22	(Gall) midges[c]	79	2.61	|
	21	Mosquitoes	81	2.52	|
1994	17	A roe-deer	2	6.55	|
	22	A squirrel[c]	5	6.38	|
	19	A pheasant	8	6.02	|
	18	A hare	9	5.99	|
	20	A black woodpecker	10	5.86	|
	21	Mosquitoes	86	2.53	

[a] The rank (R) according to the mean assessment of the general population from 1 (highest) to 100 (lowest).

[b] Means placed against the same vertical line are not significantly different (α=0.05).

[c] "(Gall) midges" was replaced by "A squirrel" in the 1994-survey.

It is at any rate a logical "fact" that, if the forest manager achieves variation in the form of a spectrum of opportunities for recreational use and experience, there is a greater probability that a number of different needs will be satisfied. - This is just one of the fundamental and simple axioms behind the "Recreation Opportunity Spectrum System," which is used in the planning and administration of recreational areas, e.g. in the USA, and which has been tested in Denmark and other countries (e.g. Clark and Stankey, 1979; Stankey and Brown, 1981; Wallsten, 1985; Brown, 1986; Canger and Koch, 1986, pp. 23ff; U.S. Forest Service, 1986; Kaltenborn, 1991).

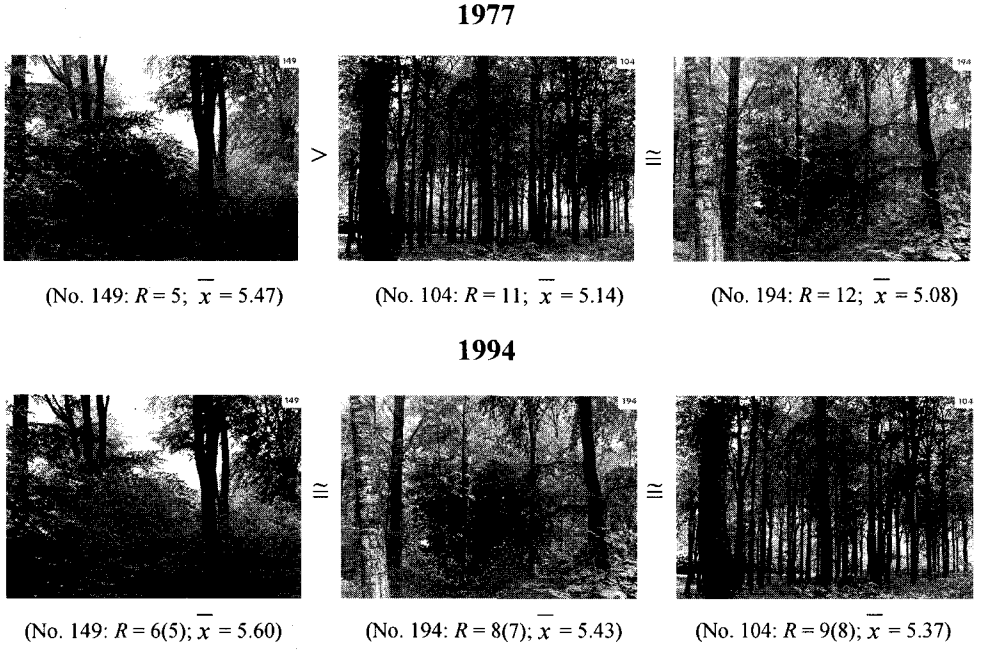


Fig. 2. The change, from 1977 to 1994, of the population's mean assessment of an old beech forest undergoing natural regeneration (no. 149), an old beech forest without understorey (no. 104) and a mixed-species forest (selection system) (no. 194).
See notes on Fig. 1.

5.2.1 NUMBER OF TREE SPECIES IN THE STAND

This question is studied through a "block" of 3 black-and-white photos: photo no. 194 shows a selection-system ("plenterwald") stand that consists, e.g. of birch, beech, Norway spruce and sycamore of different ages. As can be seen from Fig. 2, this forest type was relatively popular in 1977 - but not more popular than a monoculture of 149-year-old beech without an understorey (photo no. 104) and slightly less popular than the same 149-year-old beech stand undergoing natural regeneration (no. 149). Surveys during 1994 show largely the same results, i.e. that a 149-year-old beech stand undergoing natural regeneration is preferred to the other two forest environments. In summary, it can be concluded that, in 1994, there were no significant differences in the

population's assessment of the three stands - in contrast to the 1977-survey, in which there was a significant preference for the beech stand undergoing natural regeneration.

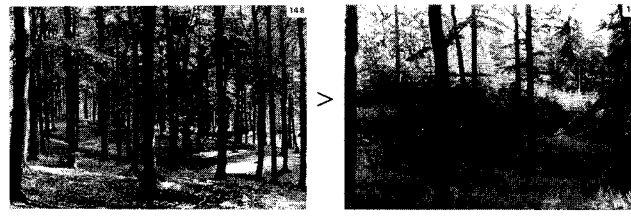
5.2.2 NUMBER OF AGES/STOREYS IN THE STAND

Fig. 2 also shows a comparison of the same 149-year-old beech stand *without* understorey (no. 104) and *with* natural regeneration (no. 149). As can be seen from the figure, the latter type of forest is preferred - mature deciduous forest undergoing regular natural regeneration - as it is self-evident for the silviculturist that the former type of forest can become the latter, and that two-storeyed deciduous forest is only a transitory stage. However, it should be noted that this difference can only be ascertained with significance in the 1977-survey.

5.2.3 SIZE OF THE FOREST STANDS

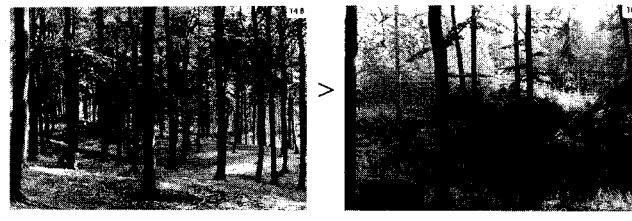
Fig. 3 shows the assessment of two selected examples of large and small unit forest formation. In the case in hand, the population preferred large unit forestry with 144-year-old beech to small unit forestry with 144-year-old beech, 17-year-old silver fir and 36-year-old Norway spruce within a small area. - A result which is more explicit in the 1994-survey than in the 1977-survey.

1977



(No. 148: $R = 4$; $\bar{x} = 5.68$) (No. 184: $R = 6$; $\bar{x} = 5.36$)

1994



(No. 148: $R = 1(1)$; $\bar{x} = 6.01$) (No. 184: $R = 7(6)$; $\bar{x} = 5.47$)

Fig. 3. According to the population's mean assessments in 1977 and 1994, an old beech forest (large unit forestry) (no. 148) ranks higher in preference than a mixed-species forest (small unit forestry) (no. 184).
See notes on Fig. 1.

However, care must be taken when generalising these results to support the assumption that the population generally prefers large unit forestry to small unit forestry. Basically, the question of assessment of large unit forestry in contrast to small unit forestry must be considered difficult to answer through the method used. The differences between the two types of forest formation are not really apparent until the observer actually moves through them. A direct presentation of the two types of forest *in natura* would therefore be preferable.

Finally, it should be noted that the chosen example of large unit forestry is a favoured type of forest - this photo attained the highest mean number of points of all 64 photos in the 1994-survey - and there is a degree of variation in the forms of the terrain that perhaps alleviates its monotony. Is it perhaps the case that large unit forestry is only perceived as truly monotonous in a flat landscape? - And visitors have probably found that, even there, monotony can have its aesthetic/experiential value, as can be found in e.g. the Danish heath plantations.

5.2.4 ROTATION AGE

Rotation age is one of the most important parameters on which the forest manager must make decisions. Much effort is spent in the field of forest economics on calculating the "optimum" rotation age. According to the mean assessment of the population in the 1977- and 1994-surveys, the popularity of deciduous forest increases as the age of the stand increases - for winter and summer alike. Concerning the popularity of coniferous forest, it was not possible to detect any direct relationship to age of stand in the results of the 1977-survey. This was, however, the case in 1994, where the pattern gets close to that found for deciduous forest.

5.3 Choice of tree species - beech as opposed to Norway spruce

The debate on Norway spruce versus beech has been active over the last decades in Denmark. In the surveys, beech and Norway spruce were compared with the aid of 5 black-and-white photos, since the two species were compared at different ages, both in summer and winter. The results show that, according to the population's mean assessment, in summer and winter alike, beech is preferred to Norway spruce. In the winter, however, there was no statistically significant difference in the 1977-survey between the young beech stand and the young Norway spruce stand, as was the case in the 1994-survey (Fig. 4 - only winter photos are shown).

5.4 Regeneration, formation and tending of stands

The population's assessment of a number of different problems associated with regeneration, formation and tending has been studied. These problems generally have no high saliency in the population's awareness, although this is of course no obstacle to clear positive and negative preferences for different alternatives (Koch and Jensen, 1988, pp. 298f). Attempts have only been made to assess a very limited selection of the vast number of alternatives associated with regeneration, formation and tending. This review of the results largely

follows operations, from the planting of the trees, until lying as logs beside the forest road.

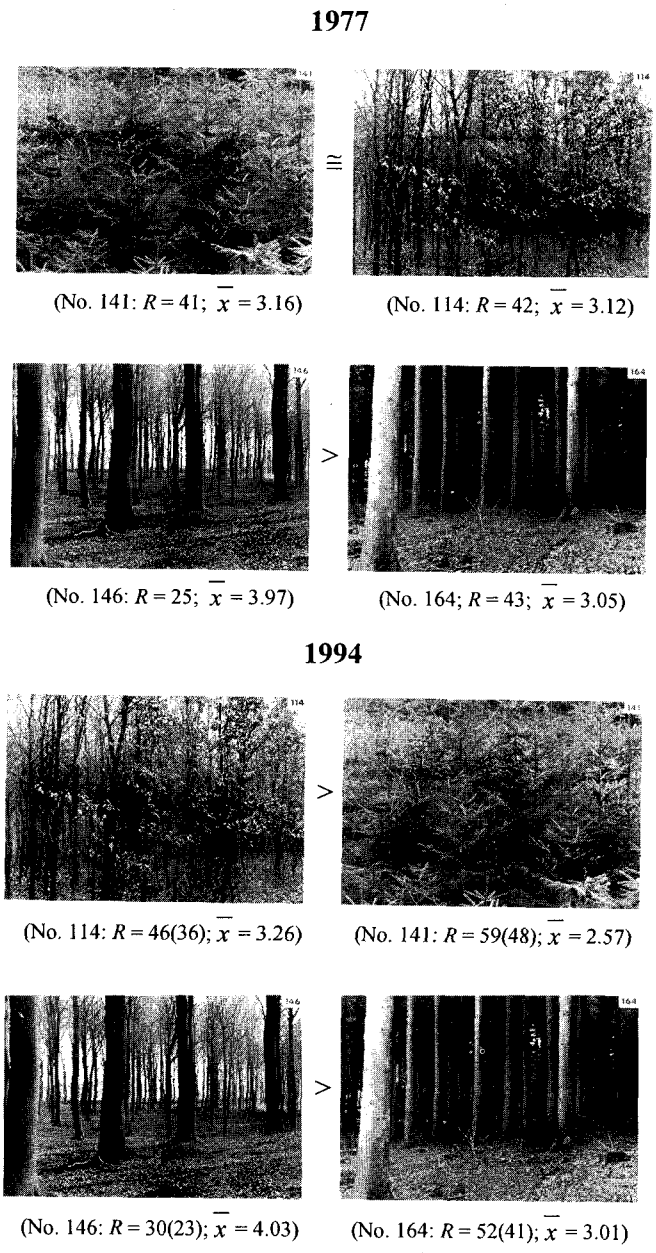


Fig. 4. In the case of winter photographs, there is no significant difference in 1977 between the population's mean assessment of a young stand of beech (no. 114) and a young stand of Norway spruce (no. 141), whereas the old beech stand (no. 146) was preferred to the old stand of Norway spruce (No. 164). In 1994, there is a significant preference for the young and old beech stands, over the young and old Norway spruce stand.

See notes on Fig. 1.

5.4.1 PLANTING

The operation itself - planting of new trees - has been assessed on the basis of a single verbal stimulus. This is a relatively popular forestry activity in 1977 and 1994 as well - significantly more popular than the *felling* of trees with a power chain-saw (Table 4, nos. 30 and 29).

Table 4. The general population's mean assessment of 7 verbal stimuli concerning different forest operations and degrees of mechanisation in 1977 and 1994.

Year	No.	Verbal stimuli	Rank R	Mean score $\bar{x}$	t-tests LSD
1977	59	A forest road	10	5.84	
	30	A forest worker planting new trees	14	5.70	
	32	A horse dragging timber out of the forest	36	4.64	
	31	A tractor dragging timber out of the forest	67	3.38	
	29	A forest worker felling trees with a power chain-saw	72	3.09	
	60	A forest road ripped up by one of the forest tractors	78	2.82	
	33	A big specially-built tractor lopping branches off felled trees	84	2.37	
1994	59	A forest road	14	5.62	
	30	A forest worker planting new trees	22	5.22	
	32	A horse dragging timber out of the forest	32	4.64	
	31	A tractor dragging timber out of the forest	75	2.96	
	29	A forest worker felling trees with a power chain-saw	78	2.85	
	60	A forest road ripped up by one of the forest tractors	85	2.57	
	33	A big specially-built tractor lopping branches off felled trees	91	2.17	

See note [a] and [b] of Table 3.

5.4.2 WEEDING, FENCING AND FERTILISATION

According to the population's mean assessment, *weeding* with scythes is a relatively acceptable operation (cf. verbal stimulus no. 23 in Table 5). The population considered the weeding of stands with herbicides to be less

acceptable than weeding with scythes (cf. nos. 23 and 24 in Table 5). Out of all 100 verbal stimuli, this operation ranked "only" 59th and 69th, respectively, in the 1977- and 1994-surveys.

The *fencing* of plantings is a relatively acceptable measure - when people understand, or are informed, that the purpose is to protect young trees (cf. verbal stimulus nos. 26 and 27 in Table 5). On the other hand, without any detailed specification of purpose or appearance, verbal stimulus no. 25: "A fence," attained only a relatively low ranking (rank 55 and 62, respectively).

Fertilisation is a significantly more acceptable measure than chemical weeding (cf. verbal stimulus nos. 28 and 24, for both 1977 and 1994).

Finally, it can be asserted that, in the period between the two surveys, changes concerning the fertilisation and weeding occurred - so that the population's mean assessment of using chemicals dropped still further.

Table 5. The general population's mean assessment of 6 verbal stimuli concerning weeding, fencing and fertilisation of forest stands in 1977 and 1994.

Year	No.	Verbal stimuli	Rank R	Mean score $\bar{x}$	t-tests LSD
1977	23	A stand of young trees, where the weeds have been cut with a scythe	22	5.17	
	26	A fence around some young trees	23	5.14	
	27	A fence around some young trees to protect them from the deer	25	5.09	
	28	A stand of trees which have been fertilised	30	4.92	
	25	A fence	55	3.94	
	24	A stand of young trees, where the weeds have been sprayed	59	3.78	
1994	23	A stand of young trees, where the weeds have been cut with a scythe	26	4.97	
	27	A fence around some young trees to protect them from the deer	30	4.80	
	26	A fence around some young trees	44	4.44	
	28	A stand of trees which have been fertilised	47	4.27	
	25	A fence	62	3.48	
	24	A stand of young trees, where the weeds have been sprayed	69	3.14	

See note [a] and [b] of Table 3.

5.4.3 DEGREE OF MECHANISATION

The choice of degree of mechanisation presents a more general problem in the regeneration, formation and tending of stands. This question was studied with the aid of 7 verbal stimuli and one black-and-white photo. - The population's general assessment is unambiguous in 1977 and 1994: the less mechanisation in the forest the better (Table 4 and Fig. 8).

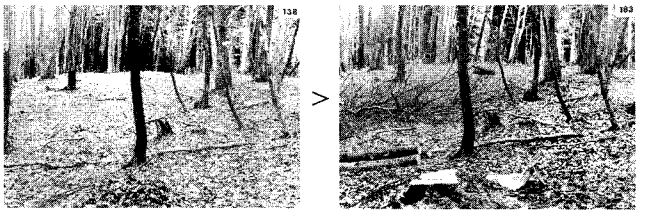
5.4.4 METHOD OF THINNING

Two methods of thinning has been assessed on the basis of photos: selective thinning and thinning by rows in Norway spruce. The photos were taken in the same, approximately 25-year-old stand, where the one part was treated with thinning by rows, whereas selective thinning was applied in the other. The selectively-felled part of the stand was preferred both in 1977 and 1994 - perhaps because it appears less geometrical and/or brighter and more open.

5.4.5 DEGREE OF THINNING

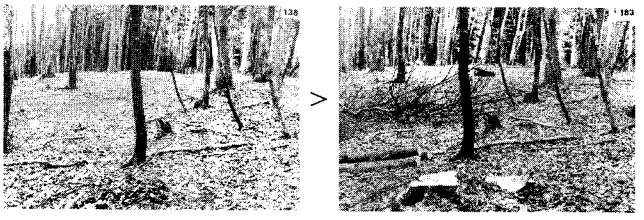
The population prefers vigorous thinning. This result is clear in the case of Norway spruce, whereas it is not statistically significant for beech. The fact that vigorous thinning did not rank higher in beech is probably due to the large quantity of logs and branches on the forest floor in the photo that depicts vigorous thinning (this is considered less desirable by the population, cf. Fig. 5). The results were practically unchanged from 1977 to 1994.

1977



(No. 138: $R = 37$; $\bar{x} = 3.37$) (No. 183: $R = 47$; $\bar{x} = 2.61$)

1994



(No. 138: $R = 34(26)$; $\bar{x} = 3.84$) (No. 183: $R = 54(43)$; $\bar{x} = 2.76$)

Fig. 5. According to the population's mean assessments in 1977 and 1994, a beech forest without logs and branches on the forest floor is preferred (no. 138 before no. 183).

See notes on Fig. 1.

5.4.6 LOGS AND BRANCHES ON THE FOREST FLOOR

As can be seen from Fig. 5, the population preferred the forest floor to be cleared of logs and branches in the 1977- and 1994-surveys. These results agree with what has been found in several surveys (e.g. Haakenstad, 1975, pp. 128ff; Hultman, 1983b, pp. 41ff; Kardell and Holmer, 1985, pp. 64ff). On the other hand, the results do not support the myth which asserts that "the public prefers to see forestry at work." This myth also conflicts with the general attitudes to mechanisation in the forest and to several operations associated with the regeneration, formation and tending of stands. - What the population prefers is the *results* achieved by forestry at work.

When discussing logs and branches which have been left over Fig. 7 should also be noticed. Here two photos shows logs and branches in a more natural setting (nos. 163 and 136) - two environments which are ranked considerably higher of the population than photo no. 147 in Fig. 5. Perhaps "natural untidiness" is preferred to "man-made untidiness"?

5.4.7 DEAD TREES

Photo nos. 162 and 126 of Fig. 6, shows the same beech forest with a dead tree and without, as the latter photo was taken after the felling and removal of dead trees. According to the mean assessment of the population, beech forest without dead trees is preferred.

It could be said that photo no. 162 presents a more disturbed black-and-white pattern due to the presence of the dead tree, and that it is this disturbed pattern, rather than the dead tree, that has conditioned the result. This argument could be valid. However, the same problem has been studied using three other pairs of photos in a pilot study. The result agreed with the result found here, but a better form of control would be a survey based on a direct presentation of the problem in the forest (Koch, 1974, p. 114). Thus, the surveys conducted so far, as well as several other surveys (e.g. Gundermann, 1974, p. 3; Hultman, 1983b, pp.42ff), indicate that the population as a whole has less understanding of the biological significance of dead trees than it has aesthetic/emotional aversion to them.

It can also be postulated that the population's understanding of the biological processes were greater at the time of the 1994-survey than when data was collected in 1977. It is not possible to confirm this hypothesis in the above comparison. It can also be asserted that information on the biological significance of dead trees would be able to raise the rank of photo no. 162. For a discussion of the impact of information, the reader is referred to section 5.5.4.

5.5 Recreation facilities and nature interpretation/information

A series of questions on recreation facilities and nature interpretation/ information was studied relatively thoroughly. This is partly because these issues are implemented to benefit recreational use and experience. And, partly, because they have relatively high saliency in the general population's awareness (Koch and Jensen, 1988, pp. 298f). Verbal stimuli were used to a considerable extent, as it is assumed that the population has a greater

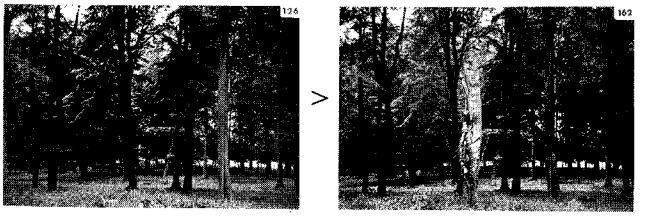
knowledge of recreation facilities than, for instance, of questions concerning forest formation and the choice of tree species.

One general methodological difficulty when assessing the general population's preferences for recreation facilities and nature interpretation/ information is that such assessments should be based on aesthetic and *functional* criteria as well. However, it cannot be precluded, that when assessing recreation facilities - partly because of the context in which the surveys were conducted - respondents have ascribed greater weight to aesthetic assessment criteria than they would do "in reality." If this hypothesis is correct, it leads to a systematically lower assessment of photos showing facilities in comparison with photos that lack such.

5.5.1 PARKING AREAS

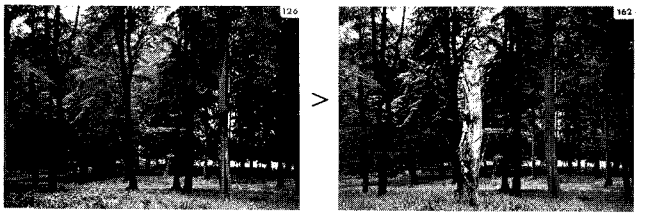
Not unexpectedly, the population preferred small parking areas in the forest in the 1977- and 1994-surveys - the smaller the better (5 cars, 25 cars, 100 cars). The fact that the 3 verbal stimuli are ranked in a logical internal sequence also provides a check on the validity of the method ("internal validity").

1977



(No. 126: $R = 2$; $\bar{x} = 5.85$) (No. 162: $R = 8$; $\bar{x} = 5.21$)

1994



(No. 126: $R = 3(3)$; $\bar{x} = 5.90$) (No. 162: $R = 16(12)$; $\bar{x} = 4.94$)

Fig. 6. According to the population's mean assessment in 1977 and 1994, preference is given to a beech forest without a broken tree-trunk (no. 126 before no. 162).
See notes on Fig. 1.

5.5.2 PATHS

The results shown in Table 6 indicate that, the less specialised and alien to the forest a path is, the more it was preferred by the population as a whole, in 1977 and 1994. The order of ranking, exercise path - bridle path - cycle path, conforms relatively well to the mean assessment of encountering the three types of forest visitor, jogger - horseman - bicyclist, cf. Table 8.

5.5.3 OTHER VISITOR FACILITIES

The preferences for 14 different structures for visitors have also been studied using verbal stimuli. The general impression agrees with the results above, i.e. the less alien a structure is in the forest, the more it is preferred by the population as a whole. Thus, it is noteworthy that, for instance, "A toilet" and "A playground with see-saws and swings" only ranked as 64th and 66th out of the 100 verbal stimuli in 1977, and as 66th and 71st in 1994.

Black-and-white photo nos. 160 and 110, show the same forest road with and without a bench. As can be seen from Fig. 8, the photo of the forest road with the discrete bench was preferred in 1977 and 1994 (not statistically significant in 1994).

In summary, the 1994-survey appears to show a trend towards a generally lower assessment of structures that are alien to the forest compared to the 1977-survey.

Table 6. The general population's mean assessment of 6 verbal stimuli concerning different types of paths in 1977 and 1994.

Year	No.	Verbal stimuli	Rank R	Mean score $\bar{x}$	t-tests LSD
1977	37	A rambling paths	7	6.06	
	59	A forest road	10	5.84	
	41	A jogging path	37	4.59	
	42	A jogging path with exercise structures	43	4.40	
	43	A bridle path	45	4.33	
	44	A cycle path	51	4.14	
1994	37	A rambling path	12	5.79	
	59	A forest road	14	5.62	
	41	A jogging path	46	4.27	
	42	A jogging path with exercise structures	51	4.06	
	43	A bridle path	57	3.85	
	44	A cycle path	59	3.65	

See note [a] and [b] of Table 3.

5.5.4 NATURE INTERPRETATION/INFORMATION

Nature interpretation/information is a comprehensive subject which has found great favour in recent years in Danish forest and landscape management (e.g. National Forest and Nature Agency, 1995, pp. 35-38). However, at the end of the 1970s, when the first of the surveys presented here was planned, nature interpretation and information were not so predominant. Studies of preferences for nature interpretation/information - and for different forms of nature interpretation - have therefore been extended in the 1994-survey, an extract of which is presented here.

A sign stating that use of open fire is prohibited in the forest was less unpopular than expected in the 1977-survey (rank 19) - this sign was assessed pronounced more unpopular in 1994 (rank 35).

More generally it can be asserted that information on *why* a given measure has been implemented can make the measure more acceptable. The results of Table 7 indicate a trend that reinforces this relationship. Thus, in 1994, the assessment of the fencing problem was less ambiguous than was the case in 1977.

Table 7. Explanations and justifications may cause better acceptance for various management practices. The general populations mean assessment in 1977 and 1994.

Year	No.	Verbal stimuli	Rank R	Mean score $\bar{x}$	t-tests LSD
1977	26	A fence around some young trees	23	5.14	|
	27	A fence around some young trees to protect them from the deer	25	5.09	|
	25	A fence	55	3.94	
	09	An area where the heather has been burnt to regenerate the moor-land	61	3.65	
	08	A burnt-off heather area	85	2.34	
1994	27	A fence around some young trees to protect them from the deer	30	4.80	
	26	A fence around some young trees	44	4.44	
	25	A fence	62	3.48	
	62	A heather area[a]	18	5.40	
	09	An area where the heather has been burnt to regenerate the moor-land	61	3.54	
	08	A burnt-off heather area	87	2.43	

See note [a] and [b] of Table 3.

[a] "A heather area" was only assessed in the 1994-survey.

Just as there has been quite vigorous development of the concept of nature interpretation/information, the issue of *natural forests* has also attained considerable favour (e.g. National Forest and Nature Agency, 1994). Thus, the 1994-survey includes photos illustrating natural forest. Since it is assumed that the concept of "natural forest" appears to be relatively complex to the respondents of the survey, it is studied the way in which a caption - "NATURAL FOREST" - influenced the population's assessment of this forest environment. The results are shown in Fig. 7. In both cases, the population ranked a natural forest higher when the photo had an informative caption. It should also be noted that all four photos were given relatively high rankings by the population - they all ranked in the upper half of the photos studied. - But even though the natural forest photos attained relatively high rankings, intensive recreational use is hardly desirable in virgin/natural forests from a scientific standpoint. This does not mean, of course, that an *awareness* of the presence of virgin/natural forests does not have considerable significance to the individual. Nor does it mean that rare visits cannot yield unusual and valuable experiences.

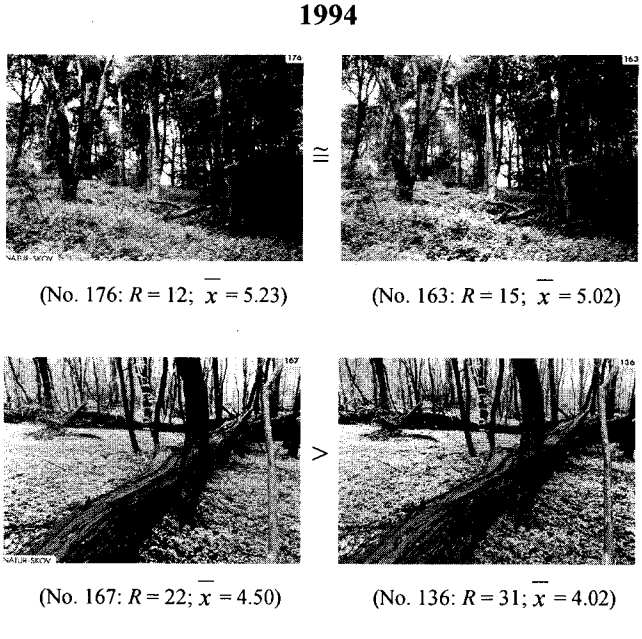


Fig. 7. Significance of information in connection with the population's mean assessments of two natural-forest environments in 1994.
See notes on Fig. 1.
Translation: "NATUR-SKOV" = Natural forest.

6. Results - influences related to recreational use

As mentioned in section 3, "influences related to recreational use" denotes the influence of other forest visitors on the quality of a visit to the forest, including the extent of any annoying/harmful behaviour and the rules imposed for limiting such behaviour. These influences have been studied relatively thoroughly, in part because it is the recreational use itself that exerts the influences and, in part, because recreational activities in forests are regulated through legislation and the manager's enforcement of this legislation. And, finally, because they are issues that assume a relatively high saliency in the public awareness (Koch and Jensen, 1988, pp. 298f).

The assessment was based on verbal stimuli to a considerable extent, as it was assumed that the issues mentioned here are relatively well-known and can be unambiguously defined merely through verbal stimuli.

6.1 Number of forest visitors

The general population's assessment of encountering different numbers of various types of forest visitors has been studied with the aid of a number of verbal stimulus. The results are summarised in Table 8.

Table 8. The general population's mean assessment in 1977 and 1994 of meeting various types of forest visitors, depending on their number.

Year	Type of forest visitors	Number				Mean
		1	**2[a]**	**5[a]**	**10**	$\bar{x}$
1977	Families in the woods	**5.02**	4.25	3.72	3.45	4.11
	Horseriders	4.83	**4.43**	**4.04**	3.56	4.22
	Joggers	4.44	4.39	4.00	**3.85**	4.17
	Bicyclists	3.80	3.78	3.16	2.99	3.43
	Hunters	3.27	3.24	2.51	2.25	2.82
	Car drivers	2.20	2.00	1.79	1.58	1.89
	Moped riders	1.92	1.67	1.49	1.28	1.59
1994	Families in the woods	**4.91**	.	.	3.12	4.02
	Horseriders	4.11	.	.	**3.46**	3.79
	Joggers	4.03	.	.	3.16	3.60
	Bicyclists	3.40	.	.	2.70	3.05
	Hunters	2.96	.	.	2.23	2.60
	Car drivers	1.89	.	.	1.42	1.66
	Moped riders	1.61	.	.	1.33	1.47

Means placed against the same horizontal or vertical line are not significantly different (α=0.05).

[a] Forest visitors in the number of 2 and 5 were not assessed in the 1994-survey.

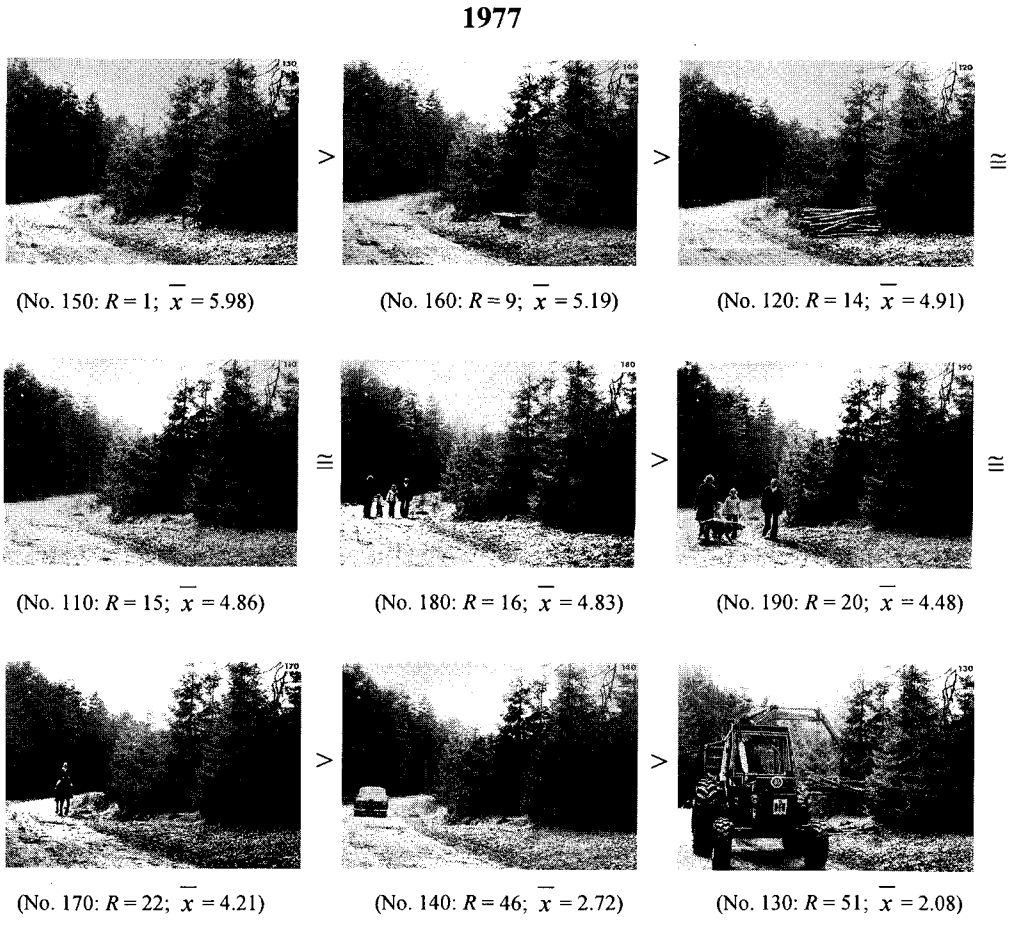


Fig. 8. The quality of a forest visit also depends on what is encountered.
See notes on Fig. 1

Seven types of forest visitor were studied: families in the woods, horseriders, joggers, bicyclists, hunters, car drivers and moped riders; each type in the following numbers: 1, 2, 5 and 10 in 1977, whereas in 1994, only 1 and 10 of each type were included. For all types of visitor, the assessment dropped as the number increased. Not unexpectedly, it can be asserted that, the fewer forest visitors encountered, the higher the perceived general quality of the forest visit.

In 1977, it was observed that an increase from 2 to 5 in the types of forest visitor studied resulted in a noticeable drop in the mean assessment, whereas increases from 1 to 2, or from 5 to 10, had less overall influence. An increase from 1 to 10 in the number of families in the woods resulted in a sharp drop in the assessment, whereas the corresponding drop is less pronounced in the case of horseriders and joggers. This applied in both surveys (Table 8). In addition there seems to be a tendency to a lower assessment of meeting other

1994

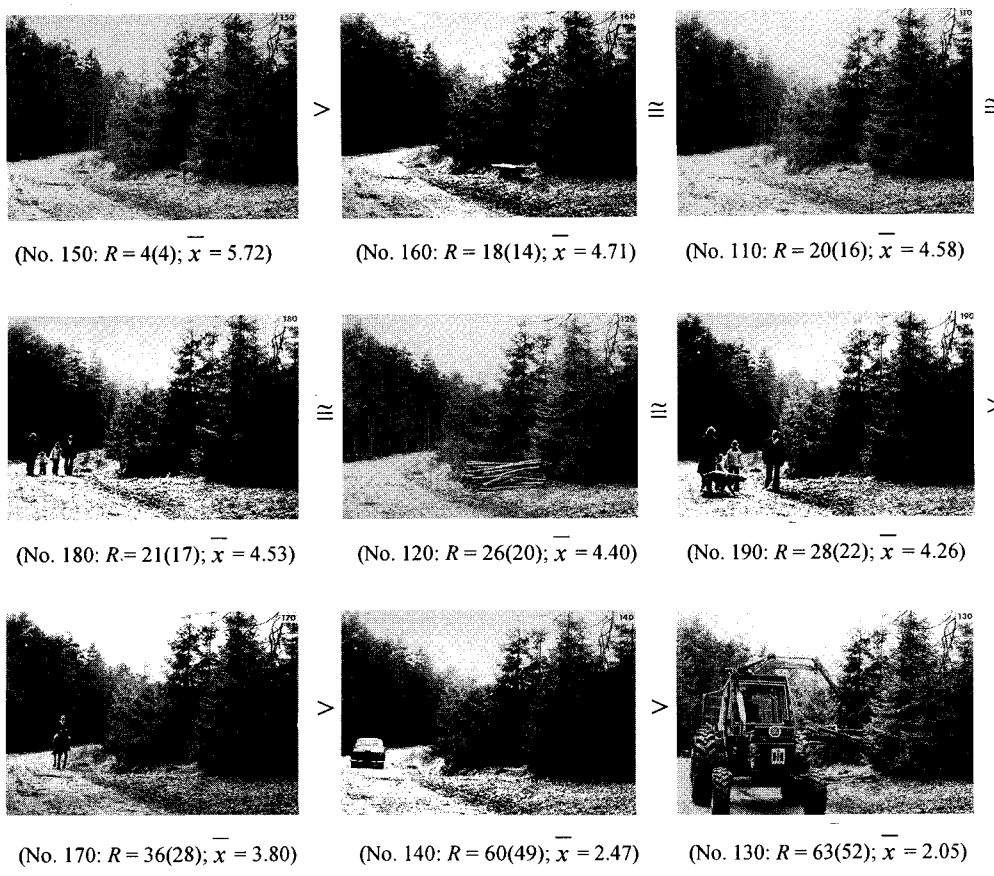


Fig. 8. (continued).

forest visitors in general (cf. the assessment of meeting 1 or 10 of the different types of forest visitors in Table 8).

The circumstance that, for *all* types of forest visitor studied, the population's mean ranking follows a logical internal sequence reinforces the confidence in the internal validity of the method (Koch and Jensen, 1988, p. 408).

6.2 Type of forest visitor

Table 8 also shows that there are great differences in the general population's mean assessment of encountering different types of forest visitor. In 1977 and 1994 as well, the types of forest visitor studied can be split into three groups: (1) the group that ranked highest: families in the woods, horseriders and joggers; (2) an intermediate group: bicyclists and hunters; and (3) the group that ranked lowest: car drivers and moped riders.

Regardless of the number (from 1 to 10), all other types of forest visitor studied - including "10 hunters" - ranked higher than "A car driver" or "A moped rider." This result agrees with the general conclusion that the population desires as little mechanisation as possible in the forest, and that "Silence" attained the highest assessment of all of the verbal stimuli used, whereas "10 moped riders" was the verbal stimulus that ranked lowest (cf. section 4).

Of the types of forest visitor studied, "A family in the forest" was the type that the population most appreciated encountering. However, if the number is increased to 10, "10 joggers" were chosen in preference to "10 horseriders" or "10 families in the woods" which, in turn, were preferred to "10 bicyclists" (Tables 8 and 10). However, "10 horseriders" and "10 joggers" changed places in the 1994-survey. - Perhaps a tendency towards (groups of) joggers being assessed more negatively by the population as a whole can be discerned?

Black-and-white photo nos. 140, 170, 180 and 190 show the same forest road with different types of forest visitors, whereas photo no. 110 shows the road without forest visitors. It can be seen from Fig. 8 that there is no significant difference between the population's assessment of the forest road with and without a family in the forest. It can also be seen that, according to the population's mean assessment, the forest road with a family is preferred to a horseman which, in turn, is preferable to the forest road with a car. Thus, it can be asserted that there was complete agreement in 1977 and 1994, between the results obtained on the basis of the verbal stimuli and of the black-and-white photos.

6.3 Disturbing and damaging behaviour

This section presents the general population's mean assessment of a number of forms of disturbing/damaging behaviour, which here should be understood as types of behaviour that are regulated/prohibited in the various rules governing public access to forests. It can generally be said that the population's overall assessment of disturbing/damaging behaviour is very low. This *could* be interpreted as an expression of a general acceptance by the population of the rules in question.

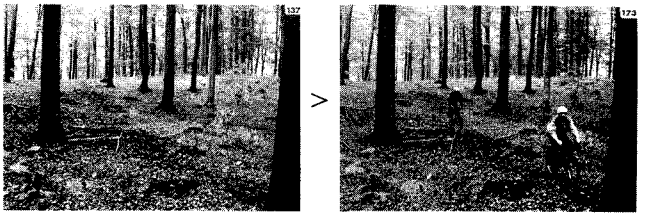
However, the surveys presented here do not answer the question of *why* the various influences were assessed as it was. The survey technique used does not clarify whether, for instance, it is a question of understanding and acceptance of the rules governing public access and visits to forests, or whether it is simply a matter of a knowledge of these rules and, therefore, an idealised/strategically response (cf. section 2.5.3). - For instance, Table 11 shows that the population's mean assessment of "A tree where someone has broken off a branch" was very low. Is it because people know that this is harmful to the tree? Is it due to aesthetic reasons? Is it because people know that this is prohibited and they wish to suit their answer to the interviewer? Or is it due to some combination of these and other factors?

6.3.1 USE OF DIFFERENT MEANS OF TRANSPORTATION

The use of different means of transportation in the forest is mentioned in section 6.2. In 1977 and 1994, in conformity with the rules on public access to forests, the general population's assessment of encountering motor vehicles (cars and mopeds) in the forest was very low; cycling received a higher ranking, but not as high as horseriders or pedestrians.

In some forests, especially close to urban areas, the use of mountain-bikes seems to be a growing problem. Therefore, the population also assessed the same forest environment with and without mountain-bike riders in the 1994-survey. Fig. 9 shows that, while the photo of an old beech stand without mountain-bike riders received one of the higher rankings - no. 14 out of the total of 64 photos - the photo taken in the same stand, but with mountain-bike riders, received one of the lowest rankings, as no. 49. In addition, the verbal stimuli "An area set aside for mountain-bike use" did not receive a high ranking (rank 80) - when the mean assessment of the general population is considered.

1994



(No. 137: $R = 14$; $\bar{x} = 5.03$) (No. 173: $R = 49$; $\bar{x} = 3.22$)

Fig. 9. According to the population's mean assessment, visitors do not like to see mountain-bike riders in an old beech stand (no. 137 before no. 173).
See notes on Fig. 1.

6.3.2 DOGS IN THE FOREST

From Table 9 it is seen that "A family in the woods" is evaluated identically whether or not the family is accompanied by a dog on a leash or not. On the other hand, if more than one dog are in question or it is uncertain if they are on a leash or not, then the assessment drops considerably. "An area where dogs may run free" has neither obtained a high ranking, an assessment which has dropped even lower in 1994 compared to 1977. - Perhaps more visitors have catched some of the problems in relation to "dog forests"?

Black-and-white photo nos. 180 and 190 show the same family with and without a dog with no leash. In conformity with the results above, it is preferred to meet the family without the dog (Fig. 8). However, there is not great agreement on the low ranking on meeting dogs without a leash in the population: the standard deviation of responses to these stimuli are among the highest in the two surveys.

Table 9. The general population's mean assessment of 4 verbal stimuli concerning dogs in the forest in 1977 and 1994.

Year	No.	Verbal stimuli	Rank R	Mean score $\bar{x}$	t-tests LSD
1977	65	A family in the woods with their dog on a leash	26	5.04	|
	61	A family in the woods	27	5.02	|
	97	An area where dogs may run free	46	4.28	|
	66	A family in the woods to exercise their dogs	52	4.12	|
1994	61	A family in the woods	27	4.91	|
	65	A family in the woods with their dog on a leash	39	4.55	|
	66	A family in the woods to exercise their dogs	52	4.04	
	97	An area where dogs may run free (a "dog forest")[a]	60	3.58	

See note [a] and [b] of Table 3.
[a] Verbal stimulus no. 97 were added "("a dog forest")" in the 1994-survey.

6.3.3 Larger events in the forest

The general population does not normally appreciate encounters with major outdoor events in the forest. The results are summarised in Table 10. The general impression given by this table agrees with earlier conclusions, i.e. the less disturbing and alien an event is to the forest, the better it can be accepted. The 1994-survey also included "An orienteering competition". Encountering such an event was ranked lower than "A scouts' tracking exercise", but considerably higher than "A military exercise". In fact, the assessment of orienteering competitions is at the same level as an encounter with "10 joggers" and "10 families in the forest".

6.3.4 Depreciative behaviour

Depreciative behaviour that causes actual damage to the forest and its trees has only been studied to a limited extent. As can be seen from Table 11, the population generally gave very low rankings to the damage studied in both surveys. Of the influences studied, the carving of names on trees was considered the most "acceptable" form of damage.

Table 10. The general population's mean assessment of 9 verbal stimuli concerning larger organised forest recreation activities in 1977 and 1994.

Year	No.	Verbal stimuli	Rank R	Mean score $\bar{x}$	t-tests LSD
1977	99	A scouts' tracking exercise	50	4.14	
	100	A military exercise	97	1.52	
	74	10 joggers	56	3.85	
	78	10 horseriders	63	3.56	|
	64	10 families in the woods	65	3.45	|
	82	10 bicyclists	73	2.99	
	70	10 hunters	86	2.25	
	90	10 car drivers	96	1.58	
	86	10 moped riders	100	1.28	
1994	99	A scouts' tracking exercise	58	3.69	
	89	An orienteering competition[a]	67	3.19	
	100	A military exercise	96	1.67	
	78	10 horseriders	63	3.46	
	74	10 joggers	68	3.16	|
	64	10 families in the woods	70	3.12	|
	82	10 bicyclists	81	2.70	
	70	10 hunters	90	2.23	
	90	10 car drivers	98	1.42	|
	86	10 moped riders	100	1.33	|

See note [a] and [b] of Table 3.

[a] "An orienteering competition" was only assessed in the 1994-survey.

Table 11. The general population's mean assessment of 3 verbal stimuli concerning various types of damage to the forest and its trees.

Year	No.	Verbal stimuli	Rank R	Mean score $\bar{x}$	t-tests LSD
1977	92	A tree where someone has carved their names	75	2.89	
	91	A tree where someone has broken off a branch	89	2.19	
	98	A pile of rubbish	99	1.38	
1994	92	A tree where someone has carved their names	77	2.92	
	91	A tree where someone has broken off a branch	84	2.58	
	98	A pile of rubbish	99	1.34	

See note [a] and [b] of Table 3. (The three means are significantly different in both surveys in Table 11).

7. Discussion

The survey with the data collection in 1977-1978 was not finally reported before 1988. When writing the summary for that survey it was stated (translated from Danish): 'It is possible that the preferences of the general population has changed from 1977/1978 to 1988. We do not *expect* that general major changes of the preferences in question has happened - and support the supposition in foreign surveys. Although it would be interesting to investigate this question more closely.' (Koch and Jensen, 1988, p. 364).

The supposition that the preferences of the Danish population not has changed can be demonstrated to be correct. The results reported in the preceding result-sections proves this assertion: It has *not* been possible to detect major changes in the preferences of the general Danish population over a period of more than 15 years. No completely alteration in preferences has been found in the topics surveyed. - A result which is general for the surveys listed in Table 1. (Although probably not complete, a table which also reveals that the number of studies related to changes over time of the preferences are relatively few - and when it comes to research covering the *general population* the number seems diminutive - zero?).

In this way Cole et al. (1995) state in their research summary: "The relatively small numbers of variables that changed consistently suggest that managers should be skeptical of the broad generalization about wilderness visitor trends that are occasionally advanced. Little evidence supports the idea that the visitors of today or the trips they take are substantially different from those of a decade or two ago". Also Palmer (1997) conclude in this direction: "...that the citizens of a town have a relatively stable understanding and scenic preference for the landscape within which they live, at least within the time frame of a decade".

An important aspect of the results from the surveys, listed in Table 1, is that they very often are *site* specific. An example of this is a result reported by Kardell and Lindhagen (1995) concerning the attitudes of visitors: One change were found in connection with the interviewees' spontaneous comments, namely that a larger part of the visitors were disturbed by car traffic. - A change which might be more due to an actual change in traffic, more than a general change in attitude/preference from 1975 to 1991. Also Lucas (1985), in general, found very few obvious changes in the visitors' preferences between 1970 and 1982. The few noticeable changes ascertained can be ascribed to changes in the character of the area studied, and to its recreational utilisation. The more general - and not site-dependent - preferences for nature and recreational use have undergone no major changes, with one single exception: preferences for natural forest fires started by lightning.

Minor changes in the Danes preferences from 1977 to 1994 have been found in relation to a few topics:

- An old beech forest undergoing natural regeneration is less pronounced preferred to the same beech stand without understorey;
- large unit forestry is preferred to small unit forestry, a result which seems to be more explicit in 1994 (see the discussion in section 5.2.3 on the methodology);
- the popularity increases as the age of the stand increases, a result which only occurred for beech in 1977 but in 1994 for Norway spruce as well;
- the assessment of using fertilisers, herbicides for weeding, and mechanisation in general in the forest is further declining. - When discussing the use of fertilisers and herbicides in the environment also the effect of information/knowledge seems relevant. In this respect, McCool and Stankey (1986) have found certain relationships between attitudes/preferences and knowledge/information: "Although we cannot establish a cause-effect relationship, the results indicate that knowledge levels have increased and attitudes have become more supportive with regard to the role of fire in wilderness, changes possibly linked to the increased amount of information made available over the past decade.";
- there might be a trend towards preference for "natural untidiness" compared to "man-made untidiness". - A result which is in tune with Kardell and Holmer (1985) who finds the proportion of respondents who notice traces of forestry work and who feel that it diminishes the quality of their visit had increased from 7.2% to 13.7% in the period from 1969-70 to 1981-82;
- a tendency towards lower preference for different kind of paths and visitor facilities in general. - Lindhagen (1996a, paper II) also finds results in this direction concerning the change in attitudes to recreation facilities/services in the forest: only minor changes have occurred, e.g. the proportion of interviewees who wish showers in the recreation forests has decreased significantly (from 26% to 12%) from 1973 to 1993. Lucas (1985) also support the result of visitors becoming more opposed to facilities (with the exception of improved trails);
- a sign stating that open fire is prohibited is getting more unpopular;
- the effect of information on why a given measure has been implemented is reinforced during the period. - Both Lucas (1985) and McCool and Stankey (1986) touch on information/knowledge in their research on attitudes towards natural forest fires: A relatively strong (and growing) relationship is found in connection with level of knowledge and attitudes to natural forest fires;
- meeting other forest visitors (and dogs) in general is decreasing. - The study by Cole et al. (1995) which presents data from three wilderness areas, also looked at tolerance of encountering other visitor groups. The results obtained are *not* consistent: At one area (Shining Rock) the tolerance have increased over time. But, in the Boundary Waters Canoe Area it decreased, and was unchanged in the Desolation Wilderness. - An example of site-dependent preferences.

It can be difficult trying to sum up the preceding (minor) trends in Danish forest preferences with a single expression; but one might state that management efforts which are alient to a *natural* environment are judged more and more negatively by the Danish population. - Although the changes in the assessment of the question of natural regeneration and large/small unit forestry not are in favour of this more general conclusion.

When comparing the relatively few studies of trends in forest preferences the overall conclusion (so far) is that the preferences studied in general are quite stable over time - at least during a decade or two. - This conclusion can be supported by Smith (1994) whose paper "Is There Real Opinion Change?" elaborate the statement that: "Most opinion change is slow and steady".

Finally, one might ask how do the favourite forest of the Danes actually look before entering a new millennium? Hopefully, the results presented here gives some answer to this - rather complicated - question. But one should have in mind that, the results presented here only reflects the *mean* of the population's desires as the aim of this article is to evaluate the general trends of the preferences. Such a mean do not provide a completely satisfactory basis on which to make decisions in forest and landscape management. If only managers attempt to satisfy "the average person" only relatively few people can be satisfied, whereas a *variegated* range of alternatives, which is in harmony with the surroundings and the *differing* desires of visitors, can satisfy far more people (e.g. Canger and Koch, 1986, pp. 25f). Shafer (1969) has considered this more closely in an article with the telling title: "The Average Camper Who Doesn't Exist". Thus, apart from determining their dependency on time and place, it must also be possible to consider preferences in relation to socio-economic data and visiting frequencies, visit duration and activities, etc. - this is done to a great extent by Koch and Jensen (1988) as well as the data from the 1994-survey provide an extensive basis for such analysis.

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References

Axelsson-Lindgren, C., 1995. Forest aesthetics. In: M. Hytönen (Editor), Multiple-use forestry in the Nordic countries. The Finnish Forest Research Institute, Helsinki, pp. 279-294.

Brown, P.J., 1986. About the Recreation Opportunity Spectrum System and Three Reports on the Application of that Technique for Recreation Planning and Management in Denmark. Skovstyrelsen, Statens forstlige Forsøgsvæsen, Sønderjyllands Amtskommune, København.

Canger, S. and Koch, N.E., 1986. Skovopbygning til glæde for friluftslivet - et arbejdsnotat. Marginaljorder og miljøinteresser, Miljøministeriets projektundersøgelser 1986, teknikerrapport nr. 8, Skov- og Naturstyrelsen, København.

Clark, R.N. and Stankey, G.H., 1979. The Recreation Opportunity Spectrum: A Framework for Planning, Management, and Research. U.S. For. Serv. Gen. Techn. Rep. Pacif. Nthwest For. Range Exp. Sta., no. PNW-98.

Cole, D.N., Watson, A.E. and Roggenbuck, J.W., 1995. Trends in Wilderness Visitors And Visits: Boundary Waters Canoe Area, Shining Rock, and Desolation Wildernesses. U.S. For. Serv. Res. Pap. Intermt. Res. Sta., no. INT-RP-483.

Goodey, B., Spencer, D. and Daniels, B. 1975. The Last Environmental Perception Checklist. Centre for Urban and Regional Studies, Research Memorandum no. 22, University of Birmingham, Birmingham.

Gregory, G.R., 1972. Forest Resource Economics. The Ronald Press Company, New York.

Gundermann, E., 1974. Praxisbezogene Überlegungen bei der Ausscheidung von Erholungswäldern. Forstarchiv, Hannover, 45: 1-6.

Haakenstad, H., 1975. Skogskjøtsel i rekreasjonsområder. Skog og friluftsliv i to modellområder i Oslomarka. Institutt for Skogskjøtsel, Norges Landbrukshøgskole, Ås.

Hendee, J.C. and Harris, R.W., 1970. Foresters' Perception of Wilderness-User Attitudes and Preferences. J. For., 68: 759-762.

Hultman, S.-G., 1981. Jägmästarns yrkesroll - på gott och ont. Sveriges Skogsvårdsförb. Tidskr., Stockholm, 6: 15-34. (Correction in 7 (1982): 79-80).

Hultman, S.-G., 1983a. Allmänhetens bedömning av skogsmiljöers lämplighet för friluftsliv. 1. Bedömning på plats eller i bild? Sveriges Lantbruksuniversitet, Avdelningen för landskapsvård, Rapport nr. 27, Uppsala.

Hultman, S.-G., 1983b. Allmänhetens bedömning av skogsmiljöers lämplighet för friluftsliv. 2. En rikstäckande enkät. Sveriges Lantbruksuniversitet, Avdelningen för landskapsvård, Rapport nr. 28, Uppsala.

Jensen, F.S., 1993. Landscape managers' and politicians' perception of the forest and landscape preferences of the population. For. & Landsc. Res., 1: 79-93.

Jensen, F.S., 1995. Forest recreation. In: M. Hytönen (Editor), Multiple-use forestry in the Nordic countries. The Finnish Forest Research Institute, Helsinki, pp. 245-278.

Jensen, F.S. and Koch, N.E., 1997. Friluftsliv i skovene 1976/77 - 1993/94. Forskningsserien nr. 20, Forskningscentret for Skov & Landskab, København.

Johnson, D.R. and Creech, J.C., 1983. Ordinal measures in multiple indicator models: a simulation of categorisation error. Am. Sociol. Rev., 48: 398-407.

Kaltenborn, B.P., 1991. Utkast til forvaltningsplan for turisme og friluftsliv på Svalbard. NINA, Norsk Institut for Naturforskning, Trondheim.

Kardell, L. and Holmer, M., 1985. Friluftslivets förändringar på Bogesundslandet 1969-1982. Sveriges Lantbruksuniversitet, Avdelningen för landskapsvård, Rapport nr. 33, Uppsala.

Kardell, L. and Lindhagen, A., 1995. Forändringar i Växjöbornas friluftsliv mellan 1975 och 1992. Sveriges Lantbruksuniversitet, Institutionen för skoglig landskapsvård, Rapport nr. 59, Uppsala.

Koch, N.E., 1974. Århusskovenes friluftsfunktion. Undersøgelser over publikums anvendelse af og krav til Århus Kommunes Skovdistrikt. Skovbrugsinstituttet, Den kgl. Veterinær- og Landbohøjskole, København.

Koch, N.E., 1977a. Skovenes friluftsfunktion. Præferencemåling. Tidligere anvendte metoder. Projekt Skov og Folk. Arbejdsnotat nr. 4. Statens forstlige Forsøgsvæsen, København.

Koch, N.E., 1977b. Skovenes friluftsfunktion. Præferencemåling. Metodeforslag. Projekt Skov og Folk. Arbejdsnotat nr. 5. Statens forstlige Forsøgsvæsen, København.

Koch, N.E. and Jensen, F.S., 1988. Skovenes friluftsfunktion i Danmark. IV. del. Befolkningens ønsker til skovenes og det åbne lands udformning. (Forest Recreation in Denmark. Part IV: The Preferences of the Population). Forstl. Forsøgsv. Danm., 41: 243-516.

Komulainen, M., 1995. Landscape management in forestry. In: M. Hytönen (Editor), Multiple-use forestry in the Nordic countries. The Finnish Forest Research Institute, Helsinki, pp. 295-320.

Lindhagen, A., 1996a. Forest Recreation in Sweden. Four Case Studies Using Quantitative and Qualitative Methods. Swedish University of Agricultural Sciences, Department of Environmental Forestry, Report no. 64, Uppsala.

Lindhagen, A., 1996b. An approach to clarifying public preferences about silvicultural systems: A case study concerning group selection and clear-cutting. Scand. J. For. Res., 11: 375-387.

Lucas, R.C., 1966. The Contribution of Environmental Research to Wilderness Policy Decisions. J. Social Issues, 22: 116-126.

Lucas, R.C., 1985. Visitor Characteristics, Attitudes, and use patterns in the Bob Marshall Wilderness Complex, 1970-82. U.S. For. Serv. Res. Pap. Intermt. Res. Sta., no. INT-345.

McCool, S.F. and Stankey, G.H., 1986. Visitor Attitudes Toward Wilderness Fire Management Policy - 1971-84. U.S. For. Serv. Res. Pap. Intermt. Res. Sta., no. INT-357.

Miller, G.A., 1956. The Magical Number Seven, Plus or Minus Two: Some Limits on our Capacity for Processing Information. The Psychological Review, 63(2): 81-97.

National Forest and Nature Agency (edit.), 1994. Strategy for Natural Forests and Other Forest Types of High Conservation Value in Denmark. (Strategi for de danske naturskove og andre bevaringsværdige skovtyper). Ministry of the Environment, the National Forest and Nature Agency, Copenhagen.

National Forest and Nature Agency (edit.), 1995. Experiencing the State Forests. Outdoor life on the areas of the National Forest and Nature Agency. Ministry of Environment and Energy, the National Forest and Nature Agency, Copenhagen.

Palmer, J.F., 1997. Stability of landscape perceptions in the face of landscape change. Landscape Urban Plann., 37: 109-113.

Potter, D.R., Sharpe, K.M., Hendee, J.C., and Clark, R.N., 1972. Questionnaires for Research: An Annotated Bibliography on Design, Construction, and Use. U.S. For. Serv. Res. Pap. Pacif. Nthwest For. Range Exp. Sta., no. PNW-150.

Ribe, R.G., 1989. The Aesthetics of Forestry: What Has Empirical Preference Research Taught Us?. Environ. Manag., 13: 55-74.

SAS Institute Inc. (edit.), 1982a. SAS User's Guide: Basics, 1982 Edition. SAS Institute Inc., Cary, N. Carolina.

SAS Institute Inc. (edit.), 1982b. SAS User's Guide: Statistics, 1982 Edition. SAS Institute Inc., Cary, N. Carolina.

Shafer, E.L., Jr., 1969. The Average Camper Who Doesn't Exist. U.S. For. Serv. Res. Pap. Ntheast. For. Exp. Sta., no. NE-142.

Skov- og Naturstyrelsen (edit.), 1996. Årsberetning 1995. Miljø- og Energiministeriet, Skov- og Naturstyrelsen, København.

Smith, T.W., 1994. Is There Real Opinion Change?. International Journal of Public Opinion Research, 6: 187-203.

Stankey, G.H. and Brown, P.J., 1981. A Technique for Recreation Planning and Management in Tomorrow's Forests. Proceedings from XVII. IUFRO World Congress, Division 6, Japan.

U.S. Forest Service (edit.), 1986. 1986 ROS Book. U.S. Dep. Agric., For. Serv., Washington D.C.

Wallsten, P., 1985. Fritidsnatur - var och hur? Modeller och begrepp för friluftslivets planering. Sveriges Lantbruksuniversitet, Avdelningen för Landskabsvård, Rapport nr. 34, Uppsala.

Willhite, R.G. and Sise, W.R., 1974. Measurement of Reaction to Forest Practice. J. For., 72: 567-571.

Zube, E.H., Sell, J.L. and Taylor, J.G., 1982. Landscape Perception: Research, Application and Theory. Landscape Plann., 9(1): 1-33.

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